"The 2nd International Conference for Science and Pharmacy"

(MSPC2)

Mutah University

Al-Karak, Jordan

October 25 – 27, 2023

Under the patronage of HE Prof. Dr. Salameh S. Naimat

President of Mutah University

Conference Chairman

Prof. Dr. Marwan S. Mousa

Surface Physics and Materials Technology Lab.

ORGANIZING COMMITTEEE

Prof. Dr. Marwan S. Mousa
Prof. Dr. Amin Aqel
Prof. Dr. Mohammed A. Al-Anber
Dr.Walid Rwadieh (University Public Relations Director)

SPONSORS

Deanship of Scientific Research at Mutah University
Arab Potash Company
Amman Chamber of Industry
Dar Al Dawa Development & Inv. Pharmaceutical Company

SCOPE OF THE CONFERENCE

The International Conference of the Faculty of Sciences & Faculty of Pharmacy at Mutah University

"The 2nd International Conference for Science and Pharmacy"

(MSPC2)

25-27 October 2023

Aims and Themes of the Conference:

- Bringing together the scientists from Mutah University and colleagues from around the world to Exchange and share their research.

- Establishing a network among those researchers

- Presenting advancement in research at Mutah in two main tracks:

a- Science (i) Physics and Chemistry Materials

b- Pharmaceutical research & industry

- Generating long-term collaborations.

- Publish fully refereed Proceedings in Scopus Jordanian Journals

--Deadline for full paper submission for refereeing: 30.11.2023

Mutah University, Al-Karak, Jordan

00962792301035 & 00962795659761

Website: www.mutah.edu.jo

Username: mspc2@mutah.edu.jo

CONFERENCE PROGRAMME

Pharmacy Auditorium

(Faculty of Pharmacy / Mutah University)

Under the Patronage of HE Prof. Dr. Salameh S. Naimat

25 October, 2023

First Session

Chairlady: Dr Lidia K. Al-Halaseh

10:00 Opening Session

Prof. Dr. Marwan S. Mousa (Conference Chairman)

Prof. Dr. Salameh Naimat (President of Mutah University)

10:15 International-Collaboration Session

Chairman: Prof. Dr. Marwan S. Mousa

Prof. Dr. Nizar Mheidat

(General Director of the Jordanian Drug and Food Administration)

Prof. Dr. Heinrich Lang

(Research Centre for Materials, Architectures and Integration of Nanomembranes (MAIN), Research Group Organometallics, Chemnitz, Germany)

Prof. Dr. Suresh Sagadevan

(Nanotechnology & Catalysis Research Centre, University of Malaya, Kuala Lumpur, Malaysia)

Prof. Dr. Mohamed Ellouze

(Sfax University, Faculty of Sciences of Sfax, LAMMA, Sfax, Tunisia)

Prof. Dr. Salima Labidi

(LNCTS Laboratory, Department of Physics, Faculty of Sciences, Badji Mokhtar University, Annaba, Algeria)

Prof. Dr. Hassan Elsayed

(Department of Microbial Biotechnology, Biotechnology Research Institute, National Research Centre, Egypt)

Group Photo

10:45 Coffee Break and Poster Session

Second Session

Chairmen: Prof. Dr. Mohammed A. Al-Anber and Prof. Dr. Mohamed Ellouze

11:55 Prof. Dr. Heinrich Lang

Research Centre for Materials, Architectures and Integration of Nanomembranes (MAIN), Research Group Organometallics, Rosenbergstrasse 6, Chemnitz Germany

Tailor-Made Molecules For New Materials

12:20 Prof. Dr. Yaseen A. Al-Soud

Department of Chemistry, College of Science, University of Al al-Bayt, Al-Mafraq, Jordan

Novel Hybrid Motifs of 4-Nitroimidazoles-Piperazines: Synthetic Approaches and Pharmacological Importance

12:45 Prof. Dr. Suresh Sagadevan

Nanotechnology & Catalysis Research Centre, University of Malaya, Kuala Lumpur 50603, Malaysia

Nanostructured photocatalysts for degradation of organic pollutants in wastewater and environmental remediation

13:10 Prof. Dr. Rula M. Darwish

Dean /Professor of School of Pharmacy /The University of Jordan

Antibiotic Resistance: The Chase and the Race

13:35 Hassan Elsayed[1] *, Rehab Moustafa [1], Reem M. El Shenawy[1], Sherine N. Khattab [2], Mona M. Agwa[3] Eman Mahmoud [1], Mohammed A. Sarhan [4,5], Mohamed Mostafa Abdel Ghafar [6], Mohamed El-Shiekh [7], Ahmed A. Yousif [6],Mohamed Shaban[6], Maysa Hanfi Shaker [8], Mohamed El-kassas [9], Weaam Gouda [10], Sherif M. shawky [11], Ahmed H.I. Faraag [12,13], Ali M. Zaki [14]

1 Department of Microbial Biotechnology, Biotechnology Research Institute, National Research Centre, Egypt; 2 Department of Chemistry, Faculty of Science, Alexandria University, Alexandria , Egypt; 3 Department of Chemistry of Natural and Microbial Products, Pharmaceutical and Drug Industries Research Division, National Research Centre, Egypt; 4 Department of Medical Microbiology and Immunology, National Liver Institute, Menoufia University, Menoufia, Egypt; 5 Department of Medical Microbiology, University of Toronto, Ontario, Canada; 6 Ahmed Maher Teaching Hospital, General Organization for Teaching hospitals and Institutes, Ministry of Health and Population, Egypt; 7 El-Matarea Teaching Hospital, General Organization for Teaching hospitals and Institutes, Ministry of Health and Population, Egypt; 8 Department of Pathology, Animal Health Research Institute, Egypt; 9 Endemic Medicine Department, Faculty of Medicine, Helwan University, Egypt;10 Department of Biochemistry, Genetic Engineering and Biotechnology Institute, National Research Centre, Egypt; 11 Biochemistry Department, Faculty of Pharmacy, Misr University for Science and Technology, Egypt; 12 Botany and Microbiology Department, Faculty of Science, Helwan University, Egypt; 13School of Biotechnology, Badr University in Cairo, Egypt 14 Microbiology Department, Faculty of Medicine, Ain-Shams University, Egypt.

Modulation of SARS-CoV-2 spike antibody responses by Multiple Antigenic Peptide vaccination

14:00 S. Labidi[1], M. Ellouze[2], M. Labidi[1,3], R. Masrour[4] , O. Ramdane[1]

1 LNCTS Laboratory, Department of Physics, Faculty of Sciences, BadjiMokhtar University, Annaba, Algeria.
2Sfax University, Faculty of Sciences of Sfax, LAMMA, B.P. 1171, 3000, Sfax, Tunisia
3 Higher School of Industrial Technologies of Annaba, Algeria
4Laboratory of Solid Physics, Faculty of Sciences, Sidi Mohamed Ben Abdellah University, BP 1796, Fes, Morocco
DFT and Monte Carlo calculations of cubic and tetragonal Ba2FeMoO6 for spintronic applications

14:25 *Coffee Break*

Third Session

Chairmen: Prof. Dr. Wael Abu Dayyih and Prof. Dr. Hassan Elsayed

14:50 Eng. Ahmad Al-Bes[1] & Eng. Fadel Labadi[2]

[1]Board Member of Jordan Chamber of Industry/ Representative of Chemical Industries Sector
[2]Manager of Industrial Development Department/ Amman Chamber of Industry
Success Stories and Challenges of Applied Scientific Research in Chemical Fertilizers Industries

15:25 M. Ellouze[1], S. Labidi[2]

1 Sfax University, Faculty of Sciences of Sfax, LAMMA, B.P. 1171, 3000, Sfax, Tunisia
2 LNCTS Laboratory, Department of Physics, Faculty of Sciences, Badji Mokhtar University, Annaba, Algeria.
Study of the structural, magnetic, and magnetocaloric effects of perovskites based on transition elements

15:40 Mayssa Abdel Hady[1]*, Rehab I Moustafa[2], Hassan Elsayed [2]

1 Department of Pharmaceutical Technology, National Research Centre, Egypt.
2 Department of Microbial Biotechnology, Biotechnology Research Institute, National Research Centre, Egypt
Achieving Lower Intraocular Pressure Using Biodegradable Drug Loaded Hydrogel

16:05 Lunch at Al Karak by the Castle with possibility for visiting the castle

18:00 Return to Amman

End of Day 1

Day 2
26 October, 2023

Fourth Session

Chair-man/woman: Prof. Dr. Amin Aqel & Prof. Dr. Salima Labidi

10:00 Dr. Kyle Cordova

Executive Director of Research for Development Sector, Senior Assistant to the President for Scientific Affairs, Royal Scientific Society,Amman 11941, Jordan
(+962) 6 534 4701 / Ext: 2726
(+962) 79 295 6022
Email: kyle.cordova@rss.jo
On-Command Drug Release from a Hydrogen-Bonded Organic Framework Equipped with a Molecular Nano-Valve

10:25 Alaa M. Abd-Elnaiem1, A. Sedky1, Ali S. Alshomrany2, A. Hakamy2*
[1]Physics Department, Faculty of Science, Assiut University, Assiut 71516, Egypt.
[2]Department of Physics, Umm Al-Qura University, Makkah, Saudi Arabia.
Influence of annealing temperature on the structure and dielectric characterization of Indium-doped Tin Oxide (ITO) thin films on a boro-float substrate prepared by radio frequency sputtering

10:40 Enas Almanasreh*, Rebekah Moles, Timothy F Chen
Research in Social and Administrative Pharmacy, Faculty of Pharmacy, Mutah University, Al-Karak, Jordan.
The medication discrepancy taxonomy (MedTax): The development and validation of a classification system for medication discrepancies identified through medication reconciliation

11:05 Coffee Break

Fifth Session

Chair-women: *Dr Lidia K. Al-Halaseh* & Prof. Dr. Mayssa Abdel Hady

12:05 Dr. Yasser Gaber
Professor of Microbiology and Immunulogy, Faculty of Pharmacy, Mutah University, AL-Karak, Jordan.
Optimizing Hepatitis A and Cholera Vaccines: Exploring Innovative Adjuvants

12:30 Yusuf M. Al-Hiari*, Moneera Alzghoul, Violet Najeeb Kasabri,
*Professor of School of Pharmacy /The University of Jordan
Chelator Fluoroquinolones with Potential Anticancer Properties

13:00 Lunch

Sixth Session
Chairmen: Prof. Dr. Mohamed Al share & Prof. Dr. Mohammad El-Khateeb

14:05 Nisreen Taiseer Al-Qaisi, Wael Abu Dayyih
Faculty of Pharmacy, Mutah University, Al-Karak, Jordan
Investigation Study of Artemisia and Dapagliflozin on HbA1c in Healthy and Induced DM Type 2 in Rats

14:30 Dr. Deeb Taher
[Ti{η5-1-(SiMe3)-3-(R)-C9H5}Cl2(OEt)] Half-Sandwich Complexes: Synthesis, Solid-State Structure, Hirshfeld surface analysis and Theoretical studies

14:55 Mohammad Alwahsh[1], Amani AlDoridee[1]
[1]Department of Pharmacy, Faculty of Pharmacy, Al-Zaytoonah University of Jordan, Amman, Jordan.
Cytotoxic Differences of Anticancer Drugs on 2D and 3D Cancer Cell Lines

15:20 Mohammad M. Allaham[a, b*], Alexandr Knápek[b], Dinara Sobola[c] and Marwan S. Mousa[d]

[a] Central European Institute of Technology, Brno University of Technology, Purkyňova 123, 612 00 Brno, Czech Republic

[b] Institute of Scientific Instruments of Czech Academy of Sciences, Královopolská 147, 612 64 Brno, Czech Republic
[c] Department of Physics, Faculty of Electrical Engineering and Communication, Brno University of Technology, Technická 2848/8, 616 00 Brno, Czech Republic
[d] Department of Physics, Mu'tah University, Al-Karak 6170, Jordan
Applications of glass-graphite micro-composites in cold field emission and scanning tunneling microscopy

15:55 Ammar Al Soud[1]*, Samer Daradkeh[1], Alexandr Knápek[2], Marwan S. Mousa[3], Dinara Sobola[1,4]
[1] Central European Institute of Technology Brno University of Technology Purkynova 656/123, 61200 Brno, Czech Republic.
[2] Institute of Scientific Instruments of the Czech Academy of Sciences Královoplská 147,612 64, 62100 Brno, Czech Republic.
[3] Department of Physics, Mutah University, 61710 Al-Karak, Jordan.
[4] Department of Physics Brno University of Technology Technická 24848/8,61600 Brno, Czech Republic.
Influence of Carbon Flakes Dopant Epoxy Electrical Properties

16:20 Coffee Break

18:30 Dinner

END of DAY 2

Day 3
27October, 2023
Marriott Hotel

10:00 Closing Session
Recommendations
Future Collaborations
11:00 Meeting with German partners:

Friedrich Naumann Foundation:
Open Discussion and Cooperation Venues

Poster Session

Chair:

P-1 Mohammad M. Allaham[a,b], Hatem A. Al-Braikat[c], Samer Dradkeh[a], Rashid Dallaev[d], Daniel Burda[b,d], Zuzana Ko selov a[e], M-Ali H Al-Akhras[f], Ahmad M D (Assad) Jaber[g], Marwan S. Mousa[c], Dinara Sobola[a,b], Alexandr Knapek[b],*, Vladim ir Kola r ik[b]

Cold field emission characteristics of graphite films deposits on glass substrate and its applications in scanning tunneling microscopy

P-2 Adel M. Abuamr[1], Mazen A. Madanat[2], Marwan S. Mousa[1]*

Field electron emission from copper tips with various thicknesses of oxide

P-3 Ammar Al Soud[1]*, Samer I. Daradkeh[1], Adel M. Abuamr[2], Alexandr Knapek[3], Marwan S. Mousa[2], Dinara Sobola[1,4]

The Effect of High Voltage on Epoxy Nanocomposite Dielectric Properties

P-4 E. Ababneha, H. Alzoubi[a], A. Qbelat[a], S. Al-Bashaish[b], Marwan S. Mousa[b]

Minimum Detectable Activity (MDA) of the Balqarad clover

P-5 Mohammed A. Al-Anber*[1], Wala Qaisi[1], Idrees F. Al-Momani[2], Dinara Sobola[3], Ahmad K. Hijazi[4], Marwan S. Mousa[5], Mazen A. Madanat[6]

Utilization of Silica Gel Nanoparticles for Selective Capturing Aqueous Uranyl Ion

P-6 Ali F. AlQaisi[1], H.Al-Dmour[1], M-Ali Al-Akras[2], Marwan S. Mousa*[1]

Field Electron Emission from Carbon Fiber Microemitters Coated with epoxy resin 478

P-7 Qasim Al-Hroub[1], Alexandr Knápek[2] and Marwan S. Mousa[1]*

Study of the Characteristics of Air Channel Single Tip Field Emission Diodes

P-8 Marwan S. Mousa[1],habil. Ildiko Tulbure[2,3,4], Marius Berca[4,5] ,Karam Al Qalawi[2]

POTENTIAL OF USING RENEWABLE ENERGY RESOURCES IN ARAB COUNTRIES

P-9 Batool M. Almarzoq[1], Marwan S. Mousa[1], Inshad Y. Jum'h [2]

PANI-CSA/TiO2- Fe2NiO4 Nanocomposite Films: optical, Morphological, and Structural Properties

P-10 Yousef Q. Pgoom[1], Ahed A. Alsarayreh[1], Yusuf. Karakus[1], Moayad A. Alsabayleh[2]

Physical properties of olive oil

P-11 Waad M. Al-Tawarh, Rakan M. Altarawneh*, Salah A. Al-Trawneh, Solhe F. Alshahateet, Samir Al-Taweel

An effective Calix[4]arene-Based Adsorbent for Tetracycline Removal from Water Systems: Kinetic, Isotherm, and Thermodynamic Studies

P-12 Mohammed A. Al-Anber[1],*, Salsabeel Al-Bayaydah[1], Ahmed A. Ahmad[2], Ahmed K. Hijazi[3], Ihsan A. Aljarrah[2]

Optical Properties of Polyvinyl Acetate Including β-Diketonate Complexes

P-13 Borhan Aldeen A. Albiss[1], Nathir A. AL-Rawashdeh[2], Asala Mohammad Khairi Saleh[2]

NH_3 GAS SENSOR BASED ON GRAPHENE NANOCOMPOSITE HYDROGELS

P-14 Lina Al-Akhras

Ionic-Electronic Coupling in PEO-PEDOT/Potassium Triflate composite Films for Organic Mixed Conductivity Enhancement

P-15 Alaa Bani Omar

Plasmon-Exciton coupling of Ag@TiO2 nanocomposites for high photocatalytic activity

P-16 Rama Abu Haifa

Crystalline Field Effects on Magnetic and Thermodynamic properties of a Ferrimagnetic Centered Rectangular Structure

P-17 Abeer Alrousa

Exploring the Thermomagnetic Behavior of Co2TiZ (Z=Al, Si, Ga, Ge, and Sn) Alloys: A Computational Study

P-18 Areen Bani Salameh

Optical and Physical Properties of Silicone Oil Extracted from the Vitreous of Patients Who Underwent Vitrectomy for Retinal Detachment

P-19 Areen Bani Salameh

E/Z Reversible Photoisomerization of Methyl Orange Doped Polyacrylic Acid-based Polyelectrolyte Brush Films

P-20 Qais M. Al-Bataineh

Wide-field surface plasmon resonance microscopy for discrete particle detection

P-21 Dina Mohammed Amerah

Polyaniline Films Doped with Protonic Acids: Protonated Polyaniline Films

P-21 Ahmad M D (Assa'd) Jaber

A quick and straightforward method to determine a film thickness of an investigated material at low primary electron energy.

P-22 Mohammed A. Al-Anber[*, 1], Neda'a Al-Adaileh [1], M. A. Zaitoun [2], Idrees F. Al-Momani [3], Ahmad K. Hijazi [4]

Synthesis and characterization of Propyltrimethyltrisamine Methyl Ester Silica Gel Material (SG-TAME) for Capturing Uranium ions

P-23 Mohammed A. Al-Anber *, [1], Malak M. Al Jaafreh [1], Idrees F. Al-Momani [2], Ahmed Hijazi [3], Dinara Sobola[4,5]

Loading of Silver (I) Ion into L-Cysteine-Functionalized Silica Gel Material

P-24 Aseel Aljabarat[1], Qassim Al-hroub[1]*, Ahmad Telfah[2], Marwan S. Mousa[1]*

Analysis of Field Electron Emission from Gold Surfaces Using FN and MG Equations

Lectures

TAILOR-MADE MOLECULES FOR NEW MATERIALS

H. Lang

Research Centre for Materials, Architectures and Integration of Nanomembranes (MAIN), Research Group Organometallics, Rosenbergstrasse 6, D-09126 Chemnitz (Germany)
heinrich.lang@chemie.tu-chemnitz.de

One focus of the talk will be directed to the use of novel organometallic and metal-organic compounds based on different transition metals (for example, Ru and Co) as precursor molecules in the Chemical Vapour Deposition process for the generation of (semi)conductive or magnetic thin conformal metal or metal oxide layers.

Also the use of combustion-CVD and 2D-printing of metal-organic (MOD) inks to produce conductive or magnetic layers and patterns on flexible substrates will be reported.

A straightforward, efficient synthetic methodology for the generation and stabilization of metal as well as metal oxide nanoparticles (= NPs) by using single-source coordination complexes of type $L_nM(O_2CCH_2(OCH_2CH_2)_2OMe)_m$ (L_nM = Ag, $Cu(PR_3)_2$, $Au(PR_3)$, $Ru(PR_3)_2(CO)_2$, $Pd(PR_3)_2$, $Pt(PR_3)_2$, Rh, Mn, Co, Ni, Fe, …; m = 1, 2, 3) without addition of any reducing reagent and stabilizing component will be envisaged. Their use in twin polymerization, a new type of a non-aqueous single step synthetic methodology for the preparation of interpenetrating phase (nano)domains of inorganic-organic hybrid materials, will be discussed. Within this topic, the synthesis of hierarchical materials such as carbon hollow spheres and the encapsulation of NPs will be highlighted (Figure 1).

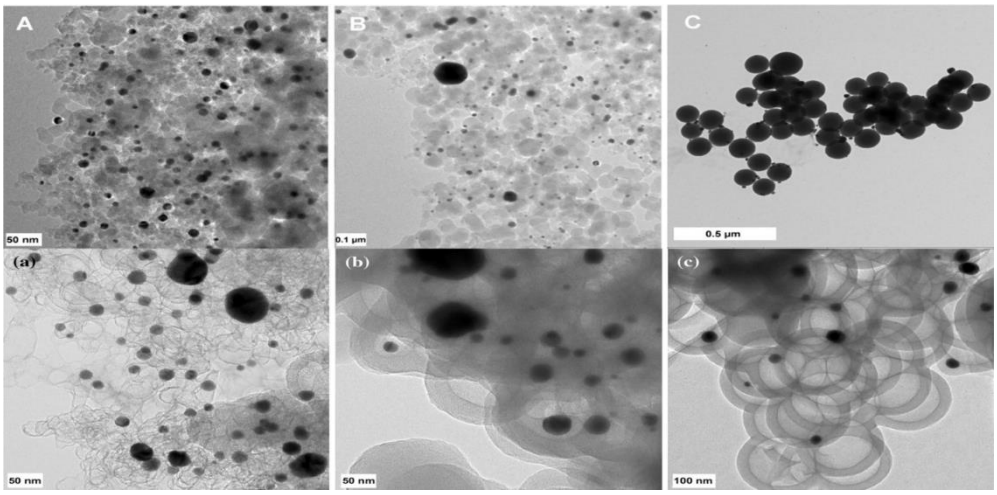


Figure 1. TEM images of templates AS90, OX50 and Stöber particles with the deposited NPs (A, Au on AS90; B, Au on OX50; C, Ag on Stöber particles) (top) and of the appropriate carbon materials (a) Au on AS90; b) Ag on OX50; c) Au on Stöber particle) (bottom).

Novel Hybrid Motifs of 4-Nitroimidazoles-Piperazines: Synthetic Approaches And Pharmacological Importance

Yaseen A. Al-Soud

Department of Chemistry, College of Science, University of Al al-Bayt, Al-Mafraq, Jordan
alsoud@aabu.edu.jo

Abstract:

The hybridization of heterocyclic motifs is a well-established methodology in recent drug discovery processes. Nitroimidazole-containing compounds are considered to be one of the most well-studied compounds in nature as well as in the synthetic world. The hybridization of nitroimidazole with various heterocyclic moieties have been performed over the last decades. In addition, imidazoles have attracted intense interest in recent years due to their diverse biological and pharmacological properties.

Over the last fifteen years, our laboratory has been synthesizing several derivatives of new 5-substituted piperazinyl-4-nitroimidazole derivatives and their evaluation for anti-HIV, anti-cancer and anti-bacterial activity [1-5]. Based on this strategy, herein, we report the synthesis, molecular docking and biological evaluations of novel hybrid nitroimidazole (imidazole-pierazine) via multistep chemical reactions with remarkable biological activity.

Key words: Synthesis, 4-Nitroimidazoles-Piperazines, Biological Activity, Molecular docking study.

Refferences

[1] Al-Soud, Y. A.; ... & Qawasmeh, R. A., *Z. Natufrorschung B*, **2021**, 76(5), 293-302.

[2] Al-Soud, Y. A.; Alhial, K. A. S.; ... & Qawasmeh, R. A., *Arkivoc*, **2021**, viii, 296-309.

[3] Al-Soud, Y.A.; ... & Qawasmeh, R. A., *Z. Natufrorschung C*, **2023**, 78(3-4), 93-103.

[4] Rasras, A. J.; ... & Al-Soud, Y. A., *Natufrorschung C*, **2023**, 78(3-4), 113-121.

[5] Saber, O. S.; Al-Qawasmeh, R. A.; ... & Al-Soud, Y. A., **2023**, *Heliyon*, 9(9), e 19327.

Nanostructured photocatalysts for degradation of organic pollutants in wastewater and environmental remediation

Suresh Sagadevan*

Nanotechnology & Catalysis Research Centre, University of Malaya, Kuala Lumpur 50603, Malaysia

Corresponding author email Id: drsureshsagadevan@um.edu.my

In recent years, nano metal oxides are widely known for their potential applications in science and technology. This has led to progress in several processes for the preparation of nanoparticles, including anticipated physiognomies, corresponding dimensions, forms, morphology, imperfections in the crystal construction, and monodispersion, for potential use in medicament applications. The nanostructured materials received much attention due to their distinctive properties such as higher damping, mechanical stability, high strength, and good thermal conductivity. The nanostructured metal oxides, in general, maintains the high surface area and that developed much interest in the research due to its wide range of applications including optical electronics, sensing devices, and nanoelectronics. Photocatalysis technology offers excellent potentials for the complete removal of organic and other biochemical pollutants in an environmentally friendly and sustainable means where the outcome is without the involvement of greenhouse gas emissions. It has been found that under UV-Visible light irradiation, the nanostructured semiconductor metal oxide photocatalysts can easily degrade many different organic and biochemical pollutants. Since the photocatalysis is a process which involves the breaks down or decomposition of various dyes, organic dirt, and biological species like harmful fungi and viruses by making use of the UV or visible light in a sustainable manner. Hence, taking into consideration the unique properties of nanoparticles (NPs) applicable to many different sectors, the present study deals with the nano metal oxides formed by the wet chemical approach. Following the synthesis, the formed nanostructures were thoroughly characterized for the crystal structure, crystallinity, surface morphology, functionality, optical properties by making use of the instrumental methods like powder X-ray diffraction (PXRD), Scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR), UV-Vis diffuse reflection spectroscopy (UV-Vis) analysis. Further testing of the photocatalytic activity through the degradation of various dye confirmed for an effective and potential catalytic nature of the synthesized samples.

Keywords: Nanostructures, photocatalytic activity, organic pollutants, and environmental remediation

Antibiotic Resistance: The Chase and the Race

Rula M. Darwish

Dean /Professor of School of Pharmacy /The University of Jordan

The increasing use of antibiotics in various health and agricultural sectors has led to the emergence of antibiotic resistance worldwide. Its irrational use can cause several problems. This incident causes antibiotic therapy to be no longer efficient and increases the cost of therapy. This resistance occurs in several types of microorganisms with a high prevalence that threatens human health. Antibiotic resistance can arise from mutations in pre-existing bacterial genomes. Mutations due to the external environment make a smaller contribution to the occurrence of resistance. Therefore, this work aims to provide an overview of the incidence of resistance in the use of antibiotics. The strategies to overcome resistance and to discuss some of the work that has been done in relation to the strategies. This include studies on the knowledge, attitude and practice regarding antibiotics among the public and the healthcare providers; Modification of the existing antibiotics to become more effective against resistance bacteria; The use of natural products to improve the efficacy of existing antibiotics. In addition to implementing antibiotic strategies due to its profound effect on improving the response to antibiotics. Overall, the incidence of resistance to the use of antibiotics has created high evolutionary pressure for the emergence of antibiotic resistance for bacterial survival. There is constant need to produce new antibiotics or to enhance the activity of the existing ones. Antibiotic stewardship is a need that has to be implemented in different healthcare setting.

Modulation of SARS-CoV-2 spike antibody responses by Multiple Antigenic Peptide vaccination

Hassan Elsayed[1 #], *Rehab Moustafa* [1], *Reem M. El Shenawy*[1], *Sherine N. Khattab* [2], *Mona M. Agwa*[3] *Eman Mahmoud* [1], *Mohammed A. Sarhan* [4,5], *Mohamed Mostafa Abdel Ghafar* [6], *Mohamed El-Shiekh* [7], *Ahmed A. Yousif*[6],*Mohamed Shaban*[6] , *Maysa Hanfi Shaker* [8], *Mohamed El-kassas* [9] , *Weaam Gouda* [10] , *Sherif M. shawky* [11], *Ahmed H.I. Faraag* [12,13] , *Ali M. Zaki* [14]

[1] Department of Microbial Biotechnology, Biotechnology Research Institute, National Research Centre, Egypt; [2] Department of Chemistry, Faculty of Science, Alexandria University, Alexandria , Egypt; [3] Department of Chemistry of Natural and Microbial Products, Pharmaceutical and Drug Industries Research Division, National Research Centre, Egypt; [4] Department of Medical Microbiology and Immunology, National Liver Institute, Menoufia University, Menoufia, Egypt; [5] Department of Medical Microbiology, University of Toronto, Ontario, Canada; [6] Ahmed Maher Teaching Hospital, General Organization for Teaching hospitals and Institutes, Ministry of Health and Population, Egypt; [7] El-Matarea Teaching Hospital, General Organization for Teaching hospitals and Institutes, Ministry of Health and Population, Egypt; [8] Department of Pathology, Animal Health Research Institute, Egypt; [9] Endemic Medicine Department, Faculty of Medicine, Helwan University, Egypt; [10] Department of Biochemistry, Genetic Engineering and Biotechnology Institute, National Research Centre, Egypt; [11] Biochemistry Department, Faculty of Pharmacy, Misr University for Science and Technology, Egypt; [12] Botany and Microbiology Department, Faculty of Science, Helwan University, Egypt; [13]School of Biotechnology, Badr University in Cairo, Egypt [14] Microbiology Department, Faculty of Medicine, Ain-Shams University, Egypt

Corresponding Author: Dr. Hassan Elsayed (PhD); ha.el-sayeed@nrc.sci.eg;

+2 01111552627

Abstract:

Despite the presence of highly efficient mRNA vaccines and other vaccines against SARS-COV-2 with proved safety, a B- and T-cell multi-epitope prophylactic vaccine that can generate effective humoral and cellular immunity against the disease is needed. Herein, we used an immunoinformatics approach to develop a multi-epitope subunit vaccine incorporating $CD4^+$T-cells and $CD8^+$T-cell epitopes of COVID-19 spike proteins. The selected epitopes were synthesized and coupled to nanoparticle vehicles. Experimental animals including rats and mice were immunized with different peptides to explore the immunogenicity and safety of our innovative vaccine applying biochemical and histopathological examination of immunized compared to non-immunized animals. Examined tissues including lungs, brains, hearts, kidneys, livers, spleens, tests and bone marrows investigated at 2 weeks and 2 months after vaccination, revealed no histo-pathological changes in the different tested organs. Interestingly,

immunized animals exhibited strong immune responses against various vaccine antigens. Also, the vaccine epitopes used in our animal experiments were able to recognize protective/specific immunoglobulins in COVID-19 patients. In addition, no reactivity towards the tested peptides was identified in our healthy volunteers. Overall, the results indicate that the selected epitopes were able to recognize antibody responses related to natural SARS-COV-2 infection in studied patient. This study describes a potential innovative multi-epitope and peptide-based vaccine that induces immune responses with no histopathological changes in experimental animals.

Key words: COVID-19 vaccine- Immune responses- Immuno-informatics- Nanoparticles- Histopathological changes.

Acknowledgment: This project was funded by Academy of Scientific Research and Technology (ASRT) Ideation Fund 7380.

DFT and Monte Carlo calculations of cubic and tetragonal Ba_2FeMoO_6 for spintronic applications

S. Labidi[1], M. Ellouze[2], M. Labidi[1,3], R. Masrour[4] , O. Ramdane[1]

[1] LNCTS Laboratory, Department of Physics, Faculty of Sciences, BadjiMokhtar University, Annaba, Algeria.
[2]Sfax University, Faculty of Sciences of Sfax, LAMMA, B.P. 1171, 3000, Sfax, Tunisia
[3] Higher School of Industrial Technologies of Annaba, Algeria
[2]Laboratory of Solid Physics, Faculty of Sciences, Sidi Mohamed Ben Abdellah University, BP 1796, Fes, Morocco

**Corresponding author: labidisalima@yahoo.fr*

Abstract

Using the first principal study, we present and discus the structural, electronic and magnetic properties of an ordered double perovskite Ba_2FeMoO_6 in the cubic (Fm-3m) and tetragonal (I4/mmm) symmetries. The phase stability for ferromagnetic (FM) and paramagnetic (NM) states, has been treated by applying the generalized gradient approximation (GGA-08). Moreover, the calculated lattice parameters are found to be in good agreement with experimental data. For understanding the electronic properties in the studies Ba_2FeMoO_6, band structure, total and partial density of states have also been performed and discussed thoroughly. Based on the magnetic results; total magnetic $M_T(\mu_B)$, and partial moments $M_{Ba}(\mu_B)$, $M_{Fe}(\mu_B)$, $M_{Mo}(\mu_B)$ and $M_O(\mu_B)$ in two types of structure have been calculated. On the other hand, the Monte Carlo simulations were used to study the magnetic properties of Ba_2FeMoO_6. The Curie temperature was established.

Keyword: Ba_2FeMoO_6; DFT; Monte Carlo simulations ; Properties calculation; Tetragonal; Ferromagnetic.

References

O. Ramdane, M. Labidi, R. Masrour, S. Labidi, M. Ellouze R. Rehamnia, *Journal of Superconductivity and Novel Magnetism* **volume 36**, pages 373-387 (2023)
https://link.springer.com/article/10.1007/s10948-022-06475-3

Success Stories and Challenges of Applied Scientific Research in Chemical Fertilizers Industries

By Eng. Ahmad Al-Bes Board Member of Jordan Chamber of Industry/

Representative of Chemical Industries Sector

&

Eng. Fadel Labadi – Manager of Industrial Development Department/

Amman Chamber of Industry

The paper mainly presents main indicators and comparative advantages of the Jordanian chemical fertilizers industries. Success stories will be presented for applied scientific research projects that have been applied by The Jordanian Manufacturing Company Al Qawafel Industrial Agricultural Co. " jointly with Researchers from Several Jordanian Universities along the last (10) years. The success stories focus on scientific research of development of chemical fertilizers (NPK) formulation by using new and alternatives ingredients that resulted in enhancing the quality and quantity of agricultural crops, decreasing factors and diseases that harm the soil in addition to decreasing the chemical residues in the crops, where such development and advancement impacted positively on the competitiveness of the manufactured fertilizers. Furthermore, the paper will highlight selected needs and challenges by Jordanian chemical industries for applied scientific research projects that can explore new cooperation opportunities between the industry and the research sector, also the paper will discuss challenges and drivers of industry innovation in Jordan covering several aspects and including the development of linkages with the academia and research sectors.

Study of the structural, magnetic, and magnetocaloric effects of perovskites based on transition elements

M. Ellouze[1], S. Labidi[2]

[1] Sfax University, Faculty of Sciences of Sfax, LAMMA, B.P. 1171, 3000, Sfax, Tunisia
[2] LNCTS Laboratory, Department of Physics, Faculty of Sciences, Badji Mokhtar University, Annaba, Algeria.

**Corresponding author:*

Mohamed.ellouze@fss.rnu.tn

Abstract

This study is essentially based on the magneto-cooling effect through magnetic refrigeration with the aim of replacing harmful gases in conventional refrigeration with a magnetic material capable of producing heat following in a weak applied magnetic field, and the production of cold during the removal of the magnetic field around the Curie temperature close to the room temperature. Since the magnetocaloric effect is present in all magnetic substances, this gives a large field of research activity to find active materials suitable for every utility.

We investigate the structural properties, magnetic properties and magnetocaloric effect of a series of oxides perovskites: $AMnO_3$ elaborated by Sol Gel method.

We will introduce also the magnetocaloric effect properties in perovskites in particularly manganites and for other magnetic materials. A summary about our research in Tunisia and specially at Sfax University (elaboration method, X-Ray powder diffraction, magnetic properties investigations etc…).

Achieving Lower Intraocular Pressure Using Biodegradable Drug Loaded Hydrogel

Mayssa Abdel Hady[1#], Rehab I Moustafa[2] , Hassan Elsayed [2]

1 Department of Pharmaceutical Technology, National Research Centre, Egypt.

2 Department of Microbial Biotechnology, Biotechnology Research Institute, National Research Centre, Egypt

Email: dr.mayssa_kandil@outlook.com

 # Presenter

Abstract:

Many eye diseases, such as glaucoma, often go unnoticed as they exhibit no symptoms. Glaucoma has earned the nickname "silent thief of sight" due to its gradual progression of visual field loss over an extended period, eventually leading to blindness. The primary risk factor for glaucoma is an increase in intraocular pressure (IOP). To address elevated IOP, antiglaucoma agents can be administered topically or systemically. Topical application is preferred for ocular disease treatment due to its simplicity and cost-effectiveness. However, the bioavailability of drugs delivered through topical ocular formulations is typically very low (less than 5%), necessitating frequent dosing to achieve therapeutic levels. This frequent dosing requirement leads to poor patient compliance, highlighting the need for the development of more convenient sustained release drug delivery systems.

In recent years, hydrogels have emerged as promising candidates for ocular drug delivery. Hydrogels offer several advantages in improving the therapeutic efficacy of ophthalmic drugs. Firstly, they can prolong the residence time of drugs at the site of administration. This extended contact allows for better drug absorption and utilization. Secondly, hydrogels can provide sustained release of drugs at the desired target site, enabling a steady and continuous supply of medication. Finally, they have the potential for co-delivery of multiple drugs, allowing for combination therapies or the simultaneous treatment of different ocular conditions.

In summary, the use of hydrogels as ocular drug delivery systems holds great promise. They offer advantages such as prolonged drug residence time, sustained release, and the potential for co-delivery of multiple drugs. By addressing the limitations of current ocular formulations, hydrogels represent an important strategy in improving the treatment of ocular diseases and enhancing patient compliance.

On-Command Drug Release from a Hydrogen-Bonded Organic Framework Equipped with a Molecular Nano-Valve

Kyle Cordova

Executive Director of Research for Development Sector
Senior Assistant to the President for Scientific Affairs
PO Box 1438,
Amman 11941, Jordan
(+962) 6 534 4701 / Ext: 2726
(+962) 79 295 6022

kyle.cordova@rss.jo

Abstract: To advance materials-based targeted therapies, biocompatible materials that have built-in, controllable release capabilities are critically important. Conventional approaches rely on the wide range of stimuli-responsive chemical attributes of such materials, but in most of these approaches, an absolute control over their release remains at the mercy of a complex biological environment in which they are intended to operate within. Therefore, it is incumbent upon materials chemists to design and develop delivery systems with release capabilities that can be activated on command. To address this, we have transferred supramolecular chemistry know-how to extended, solid-state structures. Specifically, we have synthesized a new, biocompatible hydrogen-bonded organic framework (HOF) whose pore windows are suitable for complexing with a photo-isomerizable molecule to establish a 'molecular nano-valve'. With this 'molecular nano-valve', cargo can be loaded and retained within the HOF, transferred to the site of deployment, and released on command upon exposure with light of a particular wavelength.

Influence of annealing temperature on the structure and dielectric characterization of Indium-doped Tin Oxide (ITO) thin films on a boro-float substrate prepared by radio frequency sputtering

Alaa M. Abd-Elnaiem[1], A. Sedky[1], Ali S. Alshomrany[2], A. Hakamy[2*]

[1]Physics Department, Faculty of Science, Assiut University, Assiut 71516, Egypt.
[2]Department of Physics, Umm Al-Qura University, Makkah, Saudi Arabia.

***Corresponding author: E-mails:** amhakamy@uqu.edu.sa

Abstract:

The effect of annealing temperature (T_a= 200, 250, and 300 °C) on the structural properties, ac conductivity, and complex dielectric constants (ε', ε'') of ITO thin films (~90 nm thick)/0.5 mm boro-float substrates (BFS) synthesized by RF sputtering is investigated. The XRD examination demonstrated that indium was successfully substation with tin atoms for forming ITO films and that the crystallite for the cubic phase, as well as particle sizes, are impacted by T_a. The real part of ε' was significantly dropped for all films from 2.7–5.1×10^4 to 5.3-19 range as frequency (*f*) increased to 0.25 Hz, while it was constant for further increases in ***f.*** The $\boldsymbol{\varepsilon'}$ of the as-prepared ITO/BFS has increased as T_a increases to 250 °C, then decrease at T_a=300 °C. A similar finding was detected for the loss factor with no relaxation peaks. The Q-factor has increased for all ITO/BFS as *f* increases to 100 Hz and then reduced with increasing *f* up to 20 MHz, while gradually increasing with T_a. The frequency exponent is more than 0.5 for the ITO/BFS, indicating their electronic conduction nature. The density of localized states and hopping frequency of the ITO/BFS were increased by annealing at **200 °C** meanwhile decreased for T_a = **300 °C**. The binding energy is decreased from 0.647 eV for the as-prepared ITO/BFS to 0.518 eV by annealing at **200 °C**, meanwhile increasing to 0.74 and 0.863 eV for T_a equals 250, and 300 **°C**, respectively. The Cole-Cole plots show a single semi-circular arc for all films, and their corresponding equivalent circuit was analyzed. For example, the equivalent bulk series resistance gradually decreased by annealing to **300 °C**, whereas the equivalent capacitance decreased. The resistance of grains and grain boundaries of the as-prepared ITO/BFS film is gradually decreased by increasing T_a to **250 °C**, while it is increased at **300 °C**. These outcomes recommended the ITO/BFS for high-frequency devices, integrated circuits, and supercapacitors.

The medication discrepancy taxonomy (MedTax): The development and validation of a classification system for medication discrepancies identified through medication reconciliation

Enas Almanasreh, Rebekah Moles, Timothy F Chen, **Research in Social and Administrative Pharmacy, 2020.**

Abstract

Background

Medication discrepancies directly impact patient safety and can adversely impact quality of care and resource utilization at transitions of care.

Objectives

To develop a common nomenclature and taxonomy for classifying and reporting medication discrepancies and to assess the content validity and reliability of the taxonomy.

Methods

The taxonomy was developed following a multi-stage process. The content of the taxonomy was then assessed using expert opinion through a two-round modified Delphi process. The expert panel comprised 10 experts who were selected based on pre-defined selection criteria. Six experienced pharmacists were then invited to classify medication discrepancies from a number of fictitious cases (adapted from authentic cases) using the taxonomy.

Results

The medication discrepancy taxonomy (MedTax) comprises 12 main types and 28 sub-types of discrepancies. A set of operational instructions and definitions to aid the use of the taxonomy was formulated. The overall Average content validity index (Ave-CVI) was 0.93 and interrater reliability was 0.67 (multirater κfree), indicating substantial agreement. An excellent internal consistency of the taxonomy was established (Kuder–Richardson Formula 20 (KR-20) = 0.92).

Conclusions

A content valid and reliable taxonomy for classifying medication discrepancies was developed. The MedTax may be used to classify medication discrepancies identified following medication reconciliation services. The clear and consistent reporting of medication discrepancies arising from medication reconciliation services may be of value to policy makers, healthcare professionals and researchers, when evaluating such services. The MedTax was designed to fill an essential void in global endeavors to reinforce standardization of medication reconciliation practices and to improve medication safety across transitions of care

Optimizing Hepatitis A and Cholera Vaccines: Exploring Innovative Adjuvants

Prof. Yasser Gaber

Professor of Microbiology and Immunology

Mutah University

Yasser.gaber@pharm.bsu.edu.eg

Abstract:

Vaccine adjuvants are essential for overcoming challenges associated with traditional formulations, such as cost and limited immune responses. We explored the potential of chitosan nanoparticles as innovative adjuvant materials to enhance the effectiveness of both cholera and hepatitis A vaccines. Focusing on addressing challenges related to cost and limited immune responses associated with traditional formulations. Specifically, our research involved two significant components. Firstly, we examined the superior immunogenicity of the hepatitis A vaccine adjuvanted with alginate-coated chitosan nanoparticles (HAV-aCNP). HAV-aCNP exhibited remarkable results, including a 100% seroconversion rate, elevated antibody levels, and enhanced splenocyte proliferation. Notably, it excelled in the development of crucial immune response regulators, IFN-γ and IL-10, highlighting its potential in immune response modulation. Secondly, another published article investigated the development of hepatitis A and cholera vaccine formulations, both with and without adjuvants, which were administered intraperitoneally to mice. The combined vaccination formulation, regardless of adjuvant presence, significantly enhanced both humoral and cell-mediated immune responses against hepatitis A and cholera antigens compared to individual vaccines. These findings underscore the importance of innovative adjuvants in optimizing vaccine efficacy.

References

AbdelAllah, N. H., Gaber, Y., Rashed, M. E., Azmy, A. F., Abou-Taleb, H. A., & AbdelGhani, S. (2020). Alginate-coated chitosan nanoparticles act as effective adjuvant for hepatitis A vaccine in mice. *International journal of biological macromolecules*, *152*, 904-912.

AbdelAllah, N. H., Azmy, A. F., Rashed, M. E., AbdelGhani, S., & Gaber, Y. (2022). A combined inactivated cholera and hepatitis A vaccine-induced potent protective immunity in a mouse model. *Applied Microbiology and Biotechnology*, *106*(22), 7661-7670.

Abstract

Investigation Study of Artemisia and Dapagliflozin on HbA1c in Healthy and Induced DM Type 2 in Rats

Nisreen Taiseer Al-Qaisi
Wael Abu Dayyih
Faculty of Pharmacy-Mutah University

Type 2 diabetes mellitus (T2DM) is a common metabolic illness that is becoming more prevalent worldwide, this poses considerable challenges for its identification, prevention, and treatment. There are no adequate studies about the effects of Sodium-Glucose Cotransporter 2 (SGLT-2) inhibitor; Dapagliflozin and Artemisia on Glycated hemoglobin (%HbA1c). This study highlighted the effect of SGLT-2 inhibitors and Artemisia in a group of STZ-induced T2DM rats on the %HbA1c Level. The rats used in the study (n=80, mean Weight 250±50 gm) were divided into eight groups. Each group had 10 rats, and the groups were divided as follows Group A of the healthy groups was used as a control group (no drug given), and Groups B, C, and D were given *Artemisia*, Dapagliflozin, and a mixture of Dapagliflozin and Artemisia; respectively. The remaining four groups were administered streptozocin, which developed T2DM. Group E was used as a control group (no drug was given). The rats in groups F, G, and H were given Artemisia, Dapagliflozin, and a mixture of Dapagliflozin and Artemisia; respectively. Blood samples were collected from the rats on different time frames, starting from day zero, up until day 30; the end of experiment, the samples were collected every week, and %HbA1c values reported using the Automatic Specific Protein Analyzer PA120 device, and the readings were listed on a master excel sheet, then different bioanalysis methods were used to compare the statistical significance of mean differences between diabetic and non-diabetic animals at each time points for each analyzed treatment groups; separately. After day 7 of the experiment %HbA1c values for diabetic groups compared to the control group were as follows, in group F; there was a significant decrease on %HbA1c ($P<0.001$), in group G; there was no significant decrease on %HbA1c, while in group H; there was a significant decrease on %HbA1c ($P<0.001$), according to these results, the diabetic rats treated with *Artemisia* only and a combination of Dapagliflozin and *Artemisia* measured significant decline in their mean %HbA1c across time compared to the other animals.

الملخص

داء السكري من النوع الثاني هو مرض استقلابي شائع، أصبح أكثر انتشارًا في جميع أنحاء العالم، وهذا يشكل تحديات كبيرة لتحديده والوقاية منه وعلاجه، وعليه فإنه لا توجد دراسات كافية حول تأثيرات مثبط الناقل المشارك صوديوم/جلوكوز-2 (SGLT-2)؛ الداباجليفلوزين والشيح الصحراوي على السكري التراكمي (HbA1c%). سلطت هذه الدراسة الضوء على تأثير الداباجليفلوزين والشيح في مجموعة من الجرذان المستحثة بداء السكري النوع الثاني على مستوى السكري التراكمي، حيث تم تقسيم الجرذان المستخدمة في الدراسة (وعددها 80، متوسط وزنها 250 ± 50 جم) إلى ثماني مجموعات. تحتوي كل مجموعة على 10 جرذان، وتم تقسيم المجموعات على النحو التالي: تم استخدام المجموعة أ من المجموعات السليمة كمجموعة ضابطة (لم يتم إعطاءها أي دواء)، وتم إعطاء المجموعات ب، ج، د؛ الشيح، الداباجليفلوزين، وخليط من الداباجليفلوزين والشيح؛ على التوالي. تم إعطاء المجموعات الأربع المتبقية الستربتوزوسين (STZ)، الذي أدى إلى تطور السكري من النوع الثاني. بينما تم استخدام المجموعة هـ كمجموعة ضابطة (لم يتم إعطاءها أي دواء)، وتم إعطاء الجرذان في المجموعات و، ز، ح؛ الشيح، الداباجليفلوزين، وخليط من داباجليفلوزين والشيح؛ على التوالي. تم جمع عينات الدم من الجرذان في أطر زمنية مختلفة، بدءاً من اليوم صفر وحتى اليوم 30؛ نهاية التجربة، وتم جمع العينات كل أسبوع، وتم رصد قيم السكري التراكمي باستخدام جهاز محلل البروتين النوعي التلقائي ، وتم إدراج القراءات على ورقة إكسل، ثم تم استخدام طرق التحليل الحيوي المختلفة لمقارنة الدلالة الإحصائية للمتوسط الاختلافات بين الحيوانات المصابة بالسكري وغير المصابة بالسكري في كل نقطة زمنية لكل مجموعة علاجية تم تحليلها؛ بشكل منفصل. بعد اليوم السابع من التجربة، كانت قيم السكري التراكمي (HbA1c%)لمجموعات الجرذان المصابة في السكري مقارنة بالمجموعة الضابطة كما يلي، في المجموعة و؛ كان هناك انخفاض كبير في نسبة HbA1c%(P <0.001) ، في المجموعة ز؛ لم يكن هناك انخفاض كبير في نسبة HbA1c%، بينما في المجموعة ح؛ كان هناك انخفاض كبير في نسبة السكري التراكمي (P <0.001)، ووفقًا لهذه النتائج، فإن الجرذان المصابة بداء السكري التي عولجت بالشيح فقط ومزيج من الداباجليفلوزين والشيح سجلت انخفاضًا كبيرًا في متوسط نسبة HbA1c لديهم عبر الزمن مقارنة بالجرذان الأخرى.

CHELATOR FLUOROQUINOLONES WITH POTENTIAL ANTICANCER PROPERTIES

By

Yusuf M. Al-Hiari, Moneera Alzghoul, **Violet Najeeb Kasabri,**

ABSTRACT

Background In the repurposing scheme of antimicrobial fluoroquinolones (FQs); This research aims at introducing new chelator lipophilic fluoroquinolones with anticancer properties and to establish the fact that chelation is a potential anti-proliferative mechanism.

Methodology In this work, 21 lipophilic-acid chelating FQs have been prepared, screened for antiproliferative, antioxidant and anti-inflammatory effects. In vitro Glo-I inhibition enzyme inhibition was conducted, complexation titration assay and docking studies were also carried out.

Results Exceptionally, reduced FQ series represented by **14c** exerted comparable NO – and DPPH- radicals scavenging efficacy to indomethacin and ascorbic acid. Reduced **10a, 10b and 14b FQs** (unlike the rest) were of appreciable antioxidant effects. The results show that FQs exhibited best antiproliferative activities against mainly MCF**7, HT29, T47D,** and **SW480**. In fact, many FQ derivatives have revealed IC_{50} below 10 µM mainly with **MCF7** and **HT29.** The results demonestrate that the reduced compounds **(10a-d, 14a-d)** exhibited the highest activities (lowest IC_{50}) against the **strongest 4 cell lines compared to the nitro (9,13) and the triazolo series (11,15).** All reduced series of hexyl phenyl **14 a, c, d with para halogens** were stronger than hexyl amines counterparts **10a, c, d.** In vitro cytotoxicities of majority of novel Nitro-, Reduced- and Triazolo-FQs in SW480 and HT29 72-hr incubations were either equipotent, or surprisingly, more potent than antineoplastic cisplatin. The pronounced effect of reduced series **14 a, b, c ,10a, c, d are attributed to metal** chelation within C8-C7 ethylene diamine bridge whereas the size and N1 imposed steric effect influenced the optimal space needed for chelation. Complexation studies revealed that central iron chelation is the main mechanism within cells whereas Zn chelation was the main mechanism in Zn metalo enzyme GLoI. Mechanistically NitroFQs **9d, 13a, d** and their respective Reduced FQs **14a, d** were proved unprecedentedly for equipotency to Myricetin capacity of Glo-I enzymatic inhibition (IC_{50} value of 3.5 µM). Appreciably significant Glo-I inhibition with IC_{50} values range of 24-52 µM were obtained for Nitro- and their Reduced FQs in the ascending order of 9c<9b<13b<14b<10b<10c<10d.

Conclusions FQs mechanism was through Acidic groups and C8-C7 ethylene diamine Chelation Bridge.

Keywords: Fluoroquinolones, NO-radical scavenging, Sulphorodhamine B, Cisplatin, ascorbic acid, indomethacin, Antiinflammation and antiCancer , Glyoxalase I enzyme assay and myricten.

[Ti{η^5-1-(SiMe$_3$)-3-(R)-C$_9$H$_5$}Cl$_2$(OEt)] Half-Sandwich Complexes: Synthesis, Solid-State Structure, Hirshfeld surface analysis and Theoretical studies

Deeb Taher

Department of Chemistry, School of Science, The University of Jordan, Amman 11942, Jordan. E-Mail: d.taher@ju.edu.jo

Abstract. Indenyl-titanium trichloride complexes of type [Ti{η^5-1-(SiMe$_3$)-3-(R)-C$_9$H$_5$}Cl$_3$] (**3**) (**3a**, R = SiMe$_3$; **3b**, R = ^{t}Bu) were obtained by treatment Li[1-(SiMe$_3$)-3-(R)-C$_9$H$_5$] (**1**) (**1a**, R = SiMe$_3$; **1b**, R = ^{t}Bu) with titanium tetrachloride (**2**) in a 1:1 molar ratio in the presence of isopropanol and SOCl$_2$. Half-sandwich compounds [Ti{η^5-1-(SiMe$_3$)-3-(R)-C$_9$H$_5$}Cl$_2$(OEt)] (**4**) (**4a**, R = SiMe$_3$; **4b**, R = ^{t}Bu) is accessible by the reacting **1** (**1a**, R = SiMe$_3$; **1b**, R = ^{t}Bu) with TiCl$_4$ (**2**) in the presence of ethanol and SOCl$_2$. Compounds **4a**,**b** were also accessible, when freshly prepared **3** (**3a**, R = SiMe$_3$; **3b**, R = ^{t}Bu) was reacted with a one-fold of EtOH in refluxing benzene. Spectroscopic methods and single crystal X-ray diffraction analysis confirmed the piano-stool geometry of **3a** and **4a** in the solid state. Hirshfeld surface analysis using 2D fingerprint plots of the **3a** and **4a** were conducted to elaborate on different kinds of non-covalent, inter, and intramolecular interactions that existed in the solid crystalline, which accounted for the strengthening of the crystal lattice. The molecular structures of the **3** and **4** were further investigated by using quantum-chemical calculations. The geometries of the compounds were optimised at B3LYP/6-31G(d)+LANL2DZ level of theory, and their related molecular parameters including frontier orbital energy gap and molecular electrostatic surface potential have also been calculated to better understand their properties.

Cytotoxic Differences of Anticancer Drugs on 2D and 3D Cancer Cell Lines

Mohammad Alwahsh[1], Amani AlDoridee [1]

[1]Department of Pharmacy, Faculty of Pharmacy, Al-Zaytoonah University of Jordan, Amman, Jordan.

Cancer and multidrug resistance became increasingly a concern in health care outcomes, since it was founded that the monolayer of 2D cancer cell cultures lack many important features; 3D cell cultures have the advantage of resembling tumors in their characteristics of growth, proliferation, and in their response to treatment via enhancing cell-cell interaction mimicking the in-vivo microenvironment. This study was designed to first produce 3D models using different techniques to compare the cytotoxic effect of anticancer drugs on 2D and 3D models. This study involved the following cell lines: A549, H1299, MCF-7, MDA-MB-231, PC-3, and DU-145, treated under the same conditions by: colchicine, cisplatin, paclitaxel, and doxorubicin. For 2D cell culture, these cells were cultivated in 96 well plates for 24 hours, then treatments were applied in serially diluted quantities for 48 hours, and the IC50 values were determined using the MTT assay. Afterwards, these IC50 values were used to study PIK3CA/AKT1 genes expression by PCR. While 3D cell culture was achieved by two methods: the first one is by simple rotation technique, and the second one is by 3D molds, both methods aimed at generating spheroids to be treated and tested to determine the IC50 values and the changes in expressing the genes of interest when forming the cells in 3D structure. By 3D cell culture, the anticancer agents achieved the same inhibitory level as the 2D method but at higher concentrations, for example, H1299 cell line when treated with colchicine in 2D and 3D model had IC50 (21.4µM and 34µM, respectively), and when treated with PTX in had IC50= 5µM in 2D model and IC50=14.7µM in 3D model. Additionally, the results of PIK3CA gene expression levels in H1299 also showed high fold change in 3D model in comparison with its extent in 2D model when treated with doxorubicin. PTX didn't cause PIK3CA overexpression in 2D, while surprisingly it did in 3D model, which can be explained by needing higher doses to exert the needed effect and to trigger gene pathway overexpression, in addition, showing activity in 3D model suggests more possibility in exerting the same effect if studied in vivo. It is reasonable to conclude that 3D cell cultures would be more promising than traditional 2D cell culture methods to represent the in-vivo molecular changes in response to different potential treatments and multidrug resistance development. Further studies may be required to assess the effect and side effect of using higher IC50 values in vivo, targeting PIK3CA/ AKT pathway in 3D models.

Keywords: Anticancer drugs, PIK3CA/AKT pathway, three-dimensional (3D) cell culture, two-dimensional (2D) cell culture

Applications of glass-graphite micro-composites in cold field emission and scanning tunneling microscopy

Mohammad M. Allaham[a, b*], Alexandr Knápek[b], Dinara Sobola[c] and Marwan S. Mousa[d]
a: Central European Institute of Technology, Brno University of Technology, Purkyňova 123, 612 00 Brno, Czech Republic
b: Institute of Scientific Instruments of Czech Academy of Sciences, Královopolská 147, 612 64 Brno, Czech Republic
c: Department of Physics, Faculty of Electrical Engineering and Communication, Brno University of Technology, Technická 2848/8, 616 00 Brno, Czech Republic
d: Physics Department, Mu'tah University, Al-Karak 6170, Jordan
[*]Corresponding author: allaham@isibrno.cz

Polymer graphite electron sources have shown good performance as field emission emitters in the past few years. However, the emission process was characterized by limited total emission currents [1-3]. In this paper, cold field emission characteristics were studied from cathodes prepared from three different structures of pure graphite micro-flakes. The results were compared to the cold field emission characteristics of polymer graphite to study the reasons behind the limitations in the obtained emission current densities.

The study includes full analyses of the used materials such as scanning electron microscopy, X-ray photoelectron spectroscopy, ultraviolet photoelectron spectroscopy, and field emission microscopy. Among the three structures, the cathodes that were prepared from graphite thin films deposited on a glass substrate showed superior performance, such as obtaining much higher emission current values (~ 20 times) and lower threshold voltages (~ 1/2) when compared to the results obtained from polymer graphite samples. Thus, the tested samples were operated as scanning tunneling microscope probes for scanning of micro-structures (check Fig. 1).

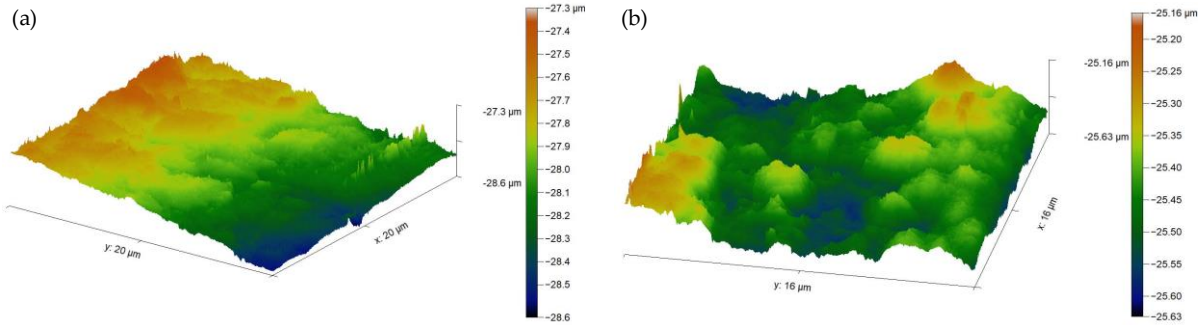


Figure 1. Scanning tunneling microscopy results of using the hybrid-GMF samples to scan the tomography of gold layer deposited on scanning electron microscopy stub.

References

[1] Knápek, A.; Dallaev, R.; Burda, D.; Sobola, D.; Allaham, M.M.; Horáček, M.; Kaspar, P.; Matějka, M.; Mousa, M.S. Field Emission Properties of Polymer Graphite Tips Prepared by Membrane Electrochemical Etching. Nanomaterials 2020, 10, 1294. https://doi.org/10.3390/nano10071294.

[2] A. Kn´apek, D. Sobola, D. Burda, A. Da˘nhel, M. S. Mousa, V. Kola˘r´ık, Polymer graphite pencil lead as a cheap alternative for classic conductive spm probes, Nanomaterials 9 (2019) 1756, https://doi.org/10.3390/nano9121756.

[3] The research was supported by the Technology Agency of the Czech Republic (project n. FW03010504), and the internal Grant Agency of the Brno University of Technology, grants numbers CEITEC VUT/FEKT-J-23-8307.

Influence of Carbon Flakes Dopant Epoxy Electrical Properties

Ammar Al Soud[1*], Samer Daradkeh[1], Alexandr Knápek[2], Marwan S. Mousa[3], Dinara Sobola[1,4]

[1:] *Central European Institute of Technology Brno University of Technology Purkynova 656/123,61200 Brno, Czech Republic.*

[2:] *Institute of Scientific Instruments of the Czech Academy of Sciences Královoplská 147,612 64, 62100 Brno, Czech Republic.*

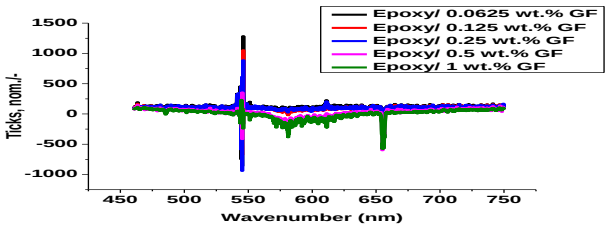
[3:] *Department of Physics, Mutah University, 61710 Al-Karak, Jordan.*

[4:] *Department of Physics Brno University of Technology Technická 24848/8,61600 Brno, Czech Republic.*

*E-mail: Ammar.al.soud@vutbr.cz

Abstract

Epoxy/ Graphite flakes (GF) micro composites were prepared in five different contents (0.0625– 1 wt.%). the GF size is in range of 100 nm to 10 µm. Electrical properties of epoxy/ GF micro composites were investigated at room temperature. The electrical propertie was measuring apparatus was based on the Novocontrol Alpha Analyser over the frequency range 10^{-2} Hz – 10^{7} Hz , the measured data were analyzed and interpreted using the Havriliak – Negami equation the master curves of the real part of permittivity and conductivity, and cole-cole plot. To determine the impact of GF on the epoxy composition, scanning electron microscopy (SEM), X-ray photoelectron spectroscopy (XPS), and Spectrophotometry of visible spectrum (VIS). At very low concentrations (0.0625 wt.%), There was a noticeable rise in all electrical properties. The epoxy/ 0.25 wt.% micreocomposite samples had a lower permittivity, and conductivity than the unfilled epoxy. at concentrations (0.125 to 0.25 wt.%), the formation of immobilized nanolayers have an impact on permittivity and conductivity, which have decreased. The initiation of contact between the GF at a concentration of 0.5 -1 wt.% leads to the formation of continuous interfacial conductive pathways, resulting in a dramatic increase in the permittivity, and conductivity. Fig.1 shows the spectrophotometric measurement for VIS Reflectance spectra of the Epoxy/GF microcomposite. It can be seen in Fig. 1 that the reflectance of the epoxy/ GF micro composite decreases as the filler concentration rises, while the absorption of the epoxy increases.



References

1 - Al Soud, A., Daradkeh, S., Knápek, A., Liedermann, K., Holcman, V. and Sobola, D., EEICT,

29 (2023) 253.

2- Latham, R.V. and Mousa, M.S., J. Phys. D: Appl. Phys.,19 (1986) 699.

3 - Al Soud, A., Knápek, A. and Mousa, M.S., Jordan J. Phys. 13 (2020) 191.

Posters

Field electron emission from copper tips with various thicknesses of oxide

Adel M. Abuamr[1], Mazen A. Madanat[2], Marwan S. Mousa[1*]

[1] *Surface Physics and Materials Technology Lab., Department of Physics, Mutah University, Al-Karak 61710, Jordan*

[2] *Metallurgy and Materials Technology Research Unit, Advanced Research Centre, Royal Scientific Society, Amman, 11941, Jordan*

In this work, the field electron emission characteristics of copper tips with various thicknesses of oxide layers were investigated using a standard field electron emission microscope (FEM). Measurements were carried out under high vacuum conditions after different relaxation periods at room temperature (RT) after preparing the sample; 1 month of relaxation at time RT for Cu 1 and 2 weeks at RT for Cu 2. The current-voltage characteristics *(I-V)* and Murphy–Good (MG) type plots in addition to the electron emission spatial distribution were used in this study to investigate the emission characteristics of the copper tips. During examining the scanning electron micrographs (SEM) of the samples, a correlation between the thickness of the oxide layer and the duration of the relaxation period has been observed. The experimental findings demonstrated a strong correlation between the field electron emission properties of the copper tips and the thickness of the oxide layer. Specifically, enhancing the efficiency of field emission was observed with the increase of the oxide thickness.

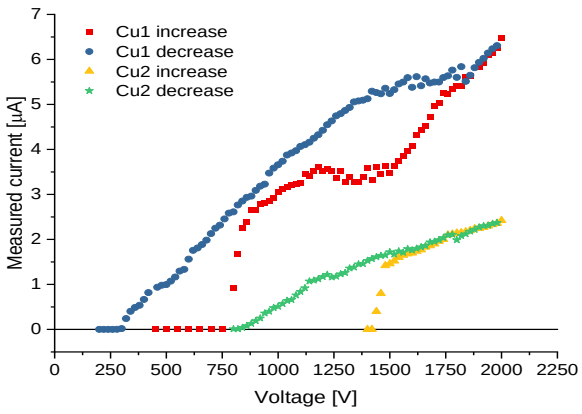


Figure 1. The current-voltage characteristics for a full testing cycle of the applied voltage for the Cu1 and Cu2 samples.

Keywords: Field electron emission; Murphy–Good (MG) plot; Copper oxide; Copper emitters.

* Corr. Author: mmousa@mutah.edu.jo

The Effect of High Voltage on Epoxy Nanocomposite Dielectric Properties

Ammar Al Soud[1*], Samer I. Daradkeh[1], Adel M. Abuamr[2], Alexandr Knápek[3], Marwan S. Mousa[2], Dinara *Sobola*[1,4]

[1:] *Central European Institute of Technology Brno University of Technology Purkynova 656/123,61200 Brno, Czech Republic.*

[2:] *Department of Physics, Mutah University, 61710 Al-Karak, Jordan.*

[3:] *Institute of Scientific Instruments of the Czech Academy of Sciences Královoplská 147,612 64, 62100 Brno, Czech Republic.*

[4:] *Department of Physics Brno University of Technology Technická 24848/8,61600 Brno, Czech Republic.*

This study examined the changes in the epoxy nanocomposite's electrical properties after connected to high voltage of 6 kV inside a field electron microscopy analysis chamber under high vacuum (10^{-5} mbar). A modified epoxy nanocomposite was created by adding 5 wt.% of Al_2O_3, SiO_2, and MgO nanoparticles, which range in size from 15 to 100 nm. The permittivity and conductivity of the epoxy nanocomposite before and after applied voltage was studied at room temperature in the frequency range of 10^{-2} - 10^7 Hz using Novo control Alpha-A analyser. Samples were characterized by scanning electron microscopy-energy dispersive X-ray spectroscopy (SEM-EDS), and optical microscope. The development of electrical trees is inhibited by the nanoparticles and the epoxy nanocomposite's operational life is extended, as demonstrated by the results. This is a fundamental necessity in high voltage systems. Fig 1. (a and b) shows the optical micrograph for unfilled epoxy (where the epoxy has not been modified by the nanoparticles) before and after applying 6 kV to unfilled epoxy resin. As can be seen in Figure 1. b, the unfilled epoxy collapses, and thus holes appear inside it when high voltages up 6 kV has been applied to the sample. This adversely affects the epoxy's electrical properties. **Kew words:** Epoxy nanocomposite, Dielectric proparites, electric trees.

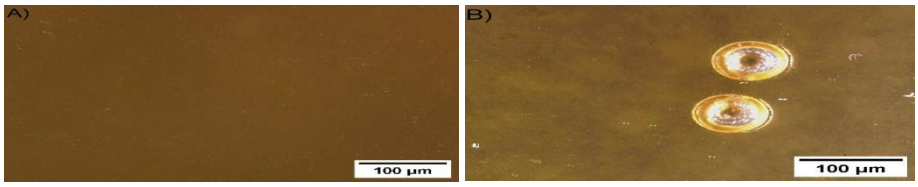


Fig 1. Optical micrograph for unfilled epoxy A) Before applying voltage. B) After applying 6 kV on the sample.

References

1 - Al Soud, A., Daradkeh, S., Knápek, A., Liedermann, K., Holcman, V. and Sobola, D., EEICT, 29 (2023) 253.

2- Latham, R.V. and Mousa, M.S., J. Phys. D: Appl. Phys.,19 (1986) 699.

3 - Al Soud, A., Knápek, A. and Mousa, M.S., Jordan J. Phys. 13 (2020) 191.

4 - M. Klampar, M. Spohner, P. Skarvada, D. Dallaeva, J. Kobrtck, and K. Liedermann, “2013 IEEE Electrical Insulation Conference, EIC 2013,” 2013, pp. 286–290.

Minimum Detectable Activity (MDA) of the Balqarad clover

Eshraq Ababneh[a], Hamza Alzoubi[a], Amjad Qbelat[a], Saleh Albashaish[b], Marwan.S. Mousa[b]

[a]*Department of Physics, Faculty of Science, Al-Balqa Applied University, Salt 19117, Jordan*

[b]*Department of Physics, Mutah University, Al-Karak 61710, Jordan*

Abstract

A major turning point in the radiation field has been the development of composite detectors such as clover and cluster detectors. This research focuses on the utilization of the Balqarad clover, a prime example of composite detectors, to address critical challenges in the field of radiation detection and measurement. The primary objective is to compares the Balqarad clover detector to alternative spectroscopic systems that were found in the literature. The findings highlight the Balqarad clover system performance, setting it apart from competing systems. Furthermore, this study extends its scope to determine the Minimum Detectable Activity (MDA) for gamma-ray sources, using a reference soil sample as a basis. We will investigate and discuss the relationship between the measured MDA values and both energy and efficiency. Notably, the MDA values exhibit more favorable results when utilizing anticoincidence measurements as opposed to normal values (without background suppression). It is worth noting that the impact of Compton suppression is evident through the clear preference for the addback mode over the direct mode. In conclusion, these findings are crucial for bridging the detector characterization gap and bringing the Balqarad clover detector into an entirely novel stage of application and investigation. Its contributions are expected to have an impact on the radiation detection field more broadly, spanning both fundamental scientific research and useful applications in fields such as nuclear safety and environmental monitorin

Utilization of Silica Gel Nanoparticles for Selective Capturing Aqueous Uranyl Ion

Mohammed A. Al-Anber [*, 1], Wala Qaisi [1], Idrees F. Al-Momani [2], Dinara Sobola[3], Ahmed K. Hijazi [4], Marwan S. Mousa[5], Mazen A. Madanat[6]

[1] *Department of Chemistry, Faculty of Sciences, Mu´tah University, P.O. Box 7, 61710 Al-Karak, Jordan; E-mail: (masachem@mutah.edu.jo).*

[2] *Department of Chemistry, Faculty of Sciences, Yarmouk University, Irbid, Jordan.*

[3] *Department of Physics, Faculty of Electrical Engineering & Communication, Brno University of Technology, Brno, Czech Republic*

[4] *Department of Chemistry, Faculty of Sciences, Jordan University of Science and Technology, Irbid, Jordan*

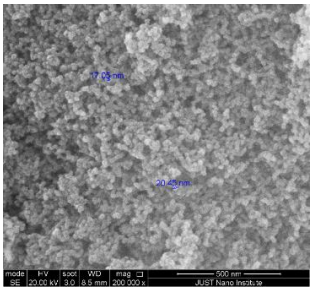
[5] *Surface Physics and Materials Technology Lab., Department of Physics, Mutah University, Al-Karak, Jordan*

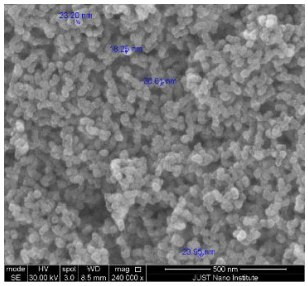
[6] *Metallurgy and Materials Technology Research Unit, Royal Scientific Society, Amman, Jordan*

Abstract

Silica gel nanoparticles (SGNP) have been successfully prepared and utilized for capturing uranyl ions from an aqueous medium with high efficiency by batch capturing. The nanoparticles are characterized by FTR, SEM, and XRD. The thermal stability of SGNP is also studied by TGA. The efficiency of SGNP in terms of capturing the aqueous uranyl ion is also examined by applying several parameters such as pH, initial concentration, contact time, and temperature. By applying these factors, it was found that the highest removal percentage of 99 % was achieved when applying C_i = 1.0 mg L^{-1}, T = 25 ºC, 80 rpm, pH$_i$ = 7, and $d$osage = 2 g L^{-1}. The equilibrium of capturing can be achieved within the first t = 40 minutes upon these study conditions. The capturing of U(VI) ion follows the Freundlich isotherm model (R^2 > 0.999). The Dubinin-Kaganer-Radushkevich capturing energy is ca. E = -24 to -36. The capturing reaction follows the pseudo-second-order kinetic model (R^2 > 0.999). Based on these promising results, Silica gel nanoparticles (SGNP) can be used as an effective filter for capturing diluted uranium (VI) ions from the water.

***Key Words**: Silica gel, nanoparticles, Uranium (VI) ion, capturing, Freundlich isotherm, Pseudo-second order*





Field Electron Emission from Carbon Fiber Microemitters Coated with epoxy resin 478

Ali F. AlQaisi[1], H. Al-Dmour[1], M-Ali AL-Akhras[2] ,Marwan S. Mousa[* 1]

1; Department of Physics, Mutah University, Al-Karak 61710, Jordan.

2; Vice Dean and Prof. of Bio-Medical PhysicsHead of Faculty at Jordan University of Science and Technology.

This work provides an experimental study into the effect of epoxy resin 478 on the field electron emission properties of clean, uncoated carbon fiber (CF) tips.
Various CF tips, with different apex radii, have been prepared, coated with different thicknesses of epoxy resin 478 layers and then studied utilizing a standard field electron emission microscope. Several field electron emission characteristics have been obtained in high-vacuum conditions. These include current-voltage characteristics, Fowler-Nordheim plots and spatial current distributions (electron-emission images). Furthermore, scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDS) are used to examine the morphology and chemical content of the carbon fiber CF tips.
The results demonstrate an important enhancement in field electron emission characteristics following the utilization of epoxy resin 478.

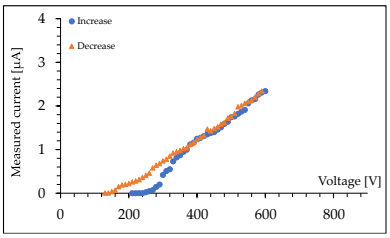


Figure 1. The current-voltage characteristics for the clean carbon fiber (CF1) tip.

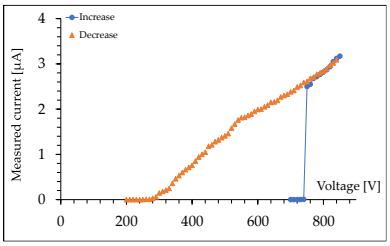


Figure 2. The current-voltage characteristics for the coated carbon fiber (CF1) tip.

Keywords: Field electron emission; Fowler-Nordheim (FN) plots; Murphy–Good (MG) method; Carbon fibers tips.

[*] Corr. Author: mmousa@mutah.edu.jo

Study of the Characteristics of Air Channel Single Tip Field Emission Diodes

Qasim Al-Hroub[1], Alexandr Knápek[2] and Marwan S. Mousa[1*]

[1]: *Department of Physics, Mu'tah University, Al-Karak 61710, Jordan.*
[2]: *Institute of Scientific Instruments of Czech Academy of Sciences, Kralovopolska 147, 612 64 Brno, Czech Republic.*
[*] Corr. Author: mmousa@mutah.edu.jo

The important development in nanotechnology technique has allowed the production of vacuum electron devices with nanogap spacing. These devices bring benefits over traditional counterparts due to their possible performance under hard conditions and several specific functionalities.

In this study, metal-based asymmetric field emission (FE) microscopy electrodes will be fabricated in a special configuration. Unlike field emission experiments, both electrodes will consist of fabricated metallic tips, where the cathode will be produced to have a micro/nano-radius of the tip, and the anode will be produced to have a much higher radius of curvature, such as 100 up to 1000 times larger in radius than the cathode. Furthermore, the system separation distance of the two electrodes will be set in the range of a few microns using visible light microscopes. The study includes testing the proposed configuration in different vacuum levels, in a try to achieve the operation of such diodes in atmospheric pressure and achieving a good field emission process in pure vacuum systems. The system will also include testing the obtained current-voltage characteristics using the Murphy-Good modern analysis method that Mu'tah University was a main partner in developing through the past few years. The results of the analysis process will be subjected to the field emission orthodoxy test to study the characterization parameters of both electrodes that describe the emission process. This includes the formal emission area and the voltage conversion length.

Figure 1. shows the technique used for the fabrication of the overhanging electrodes.

Keywords: Nanotechnology; Field electron emission; Fowler-Nordheim (FN) plots; Murphy–Good (MG) method; Diodes; Tungsten tips.

References:

1. L. B. De Rose, A. Scherer, and W. M. Jones, IEEE Tans. Electron Devices **67**, 5125
2. Latham, R.V. and Mousa, M.S., J. Phys. D:Appl. Phys., 19 (1986) 699.
3. Allaham, M.M., Forbes, R.G., Knápek, A.and Mousa, M.S., J. Elec. Eng. Slovak, 71(2020) 37.

POTENTIAL OF USING RENEWABLE ENERGY RESOURCES IN ARAB COUNTRIES

Prof. Dr. Marwan S. Mousa[1]

Prof. Dr. eng. habil. Ildiko Tulbure[2,3,4]

PhD Fellow eng. Marius Berca[4,5]

Master student Karam Al Qalawi[2]

[1] *Mu'tah University, Al Karak,* ***Jordan***
[2] *University "1 Decembrie 1918" Alba Iulia,* ***Romania***
[3] *Technical University of Cluj-Napoca,* ***Romania***
[4] *Clausthal University of Technology,* ***Germany***
[5] *Oltenia Energy Complex, Tg. Jiu,* ***Romania***

ABSTRACT

Growing humanity's quality of life has been undoubtedly possible using different energy resources around the world, what brought technological advance. Although currently fossil fuels are mostly used worldwide, to assure human sustainability, there is a need for a reorientation in the direction of using renewable energy resources. On the one side fossil fuels are limited, and on the other side their usage has as a result unwanted environmental pollution, global warming, and climate change. Being aware of created situation, scientists are currently looking for best strategies to overcome these challenges for succeeding in assuring sustainability of human society. Most appropriate way seems currently to be finding best strategies to apply renewable energy resources for assuring the energy supply, such as solar, wind, water energy as well as bioenergy. Considering regional conditions related to Arab countries it is obvious that main role for assuring sustainable energy supply in this part of the world could be played by using solar energy. By considering various levels of solar radiation in different parts of the world, conditions for Arab countries to generate electric energy by photovoltaic panels will be pointed out. In this context a specific case study in Jordan will be presented in this proposed contribution regarding usage of solar energy, and conclusion will be drawn.

Keywords: renewable energy resources, Arab countries, solar energy, environmental impact, sustainability

PANI-CSA/TiO2- Fe2NiO4 Nanocomposite Films: optical, Morphological, and Structural Properties

Batool M. Almarzoq 1
Supervisor: Dr. Marwan S. Mousa 1. Co supervisor: Dr. Inshad Y. Jum'h 2
1 Department of Physics, Mutah University, AL-Karak, Jordan.
2 German-Jordanian University, Madaba ,Jordan

Nanocomposite films were created by synthesizing protonated Polyaniline with Camphor Sulfonic Acid (PANI-CSA) and integrating them with Titanium Dioxide nanoparticles (TiO2 NPs) along with varying amounts of Iron Nickel Oxide nanoparticles (Fe2NiO4 NPS). These films were then deposited onto Silicon and glass substrates using a casting method. Fourier Transform Infrared Spectroscopy was employed to confirm the successful incorporation of TiO2-Fe2NiO4 into the PANI-CSA matrix. The PANI-CSA film displayed a semicrystalline nature, characterized by a diffraction plane of (010). The introduction of TiO2 NPs and Fe2NiO4 NPs into the PANI-CSA film resulted in the appearance of TiO2 and Fe2NiO4 diffraction angles with varying intensities. PANI-CSA film exhibits a smooth nature with appearing of short rods on the film surface. Introducing TiO2NPs-Fe2NiO4NPs into PANI-CSA film variate the surface morphology of the nanocomposite films. The bandgap energy of PANI-CSA film is 3.81 eV. Introducing TiO2NPs into the PANI-CSA film decreases the bandgap energy to 3.75 eV, whereas introducing Fe2NiO4NPs into the PANI-CSA film decreases the bandgap energy to 3.66 eV. The minimum bandgap energy was 3.48 eV at PANI-CSA/TiO2-Fe2NiO4 (0.6:0.4) nanocomposite film. The average electrical conductivity of PANICSA film is about 0.05 S.cm-1 . Introducing TiO2 into the PANI-CSA matrix increases the electrical conductivity of the PANI-CSA/TiO2 nanocomposite film to 0.09 S.cm-1 . Increasing Fe2NiO4NPs concentration with decreasing TiO2NPs concentration increases the electrical conductivity continuously to 0.38 S.cm-1 . Thermal Gravimetric Analysis results show that PANICSA/TiO2-Fe2NiO4 nanocomposite films are thermally stable in temperatures up to 300°C.

Physical properties of olive oil

Yousef Q. Pgoom[1], Ahed A. Alsarayreh[1], Yusuf. Karakus[1], Moayad A. Alsabayleh[2]

1,Sakarya University, Turkiya

2, Mutah University, Jordan

ABSTRACT: The study aims to the optical properties of olive oil by measuring the refractive index using the Abbe device at different temperatures at the sodium wavelength. As well as using the spectrometer to measure the smallest angle of deviation to calculate the index of refraction at different wavelengths within the visible range and at different temperatures. Using a pycnometer, the density was measured at different temperatures. The molar refractive index was calculated based on both density and refractive measurements index by analysing eight equations. After comparing them, it was concluded that the best equation representing the measured results is the Lorentz-Lorenz equation. In addition, the polarizability was calculated and the absorbance of olive oil was measured in the visible range (200nm-800nm).

An effective Calix[4]arene-Based Adsorbent for Tetracycline Removal from Water Systems: Kinetic, Isotherm, and Thermodynamic Studies

Authors: Waad M. Al-Tawarh, Rakan M. Altarawneh*, Salah A. Al-Trawneh, Solhe F. Alshahateet, Samir Al-Taweel.

This study aims to investigate the adsorption characteristics of tetracycline (TC) from polluted waters using C-4-hydroxyphenylcalix[4]resorcinarene (HPCR) as an adsorbent. The adsorptive efficiency of HPCR is optimized by adjusting various operational parameters such as the adsorbent dosage, the pH, the contact time, the temperature, and the adsorbate initial concentration. The most efficient remediation is 96% at 10.0 mg/L TC as the initial concentration, 1.0 mg/L HPCR, a contact time of 30 minutes, pH 5.6, and ambient temperature. The adsorption ability of HPCR towards TC is also investigated in water with different characteristics, including solutions with and without the addition of background salts. The results show that HPCR can effectively remove TC from aqueous solutions with an adsorption capacity of ca. 36.9 mg/g. The study also finds that the removal process followed pseudo- second order kinetics and Freundlich isotherm models. Moreover, the adsorption is spontaneous and exothermic, suggesting a thermodynamically favorable chemisorption process. In addition, the optimized method is successfully applied to remove TC from various real natural water systems.

Optical Properties of Polyvinyl Acetate Including β-Diketonate Complexes

Mohammed A. Al-Anber [1,*], Salsabeel Al-Bayaydah [1], Ahmed A. Ahmad [2], Ahmed K. Hijazi [3], Ihsan A. Aljarrah [2]

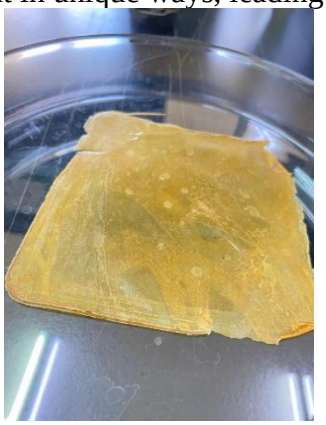
[1] *Department of Chemistry, Faculty of Sciences, Mutah University, P.O. Box 7, 61710 Al-Karak, Jordan*

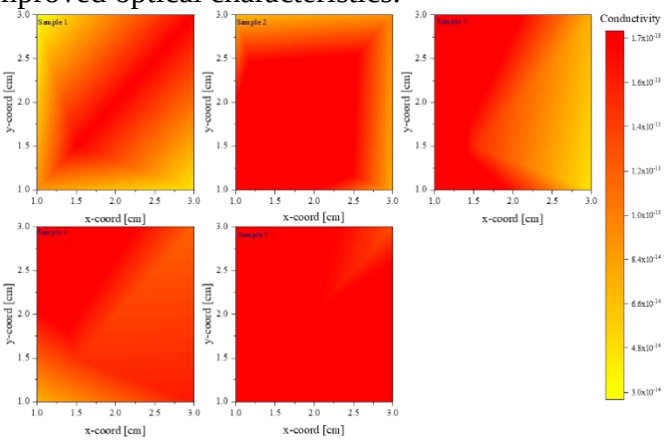
[2] *Department of Physics, Faculty of Science and Arts, Jordan University of Science and Technology, P.O. Box: 3030, Irbid-22110, Jordan*

[3] *Department of Chemistry, Faculty of Sciences, Jordan University of Science and Technology, Irbid, Jordan*

Abstract

Polyvinyl acetate (PVA) is a synthetic polymer with versatile applications. It is a type of thermoplastic polymer that is widely used in various industries due to its adhesive and film-forming properties. PVA is known for its ability to form strong, flexible, and transparent films when it dries, making it useful in a variety of products and processes. Therefore, elevating the optical properties of polyvinyl acetate through β-diketone complex enhancements addresses diverse challenges and opportunities across technology, science, and industry. It offers the potential to create high-performance materials with improved light-related characteristics, impacting fields ranging from electronics to energy and beyond. (i) It could create functional materials with advanced light-manipulating capabilities. These materials can find applications in optics, photonics, and displays, enabling the development of more efficient and versatile devices. (ii) it can contribute to the optimization of optoelectronic devices. This includes enhancing the efficiency of light-emitting diodes (LEDs), lasers, photodetectors, and other light-based technologies. (iii) can enhance the performance of polyvinyl acetate in solar energy conversion cells. By increasing light absorption, transmission, and energy conversion efficiency, these cells' overall energy harvesting capabilities can be augmented.One reported example of enhancing the optical properties of polyvinyl acetate through metal complexation involves the incorporation of metal nanoparticles into the polymer matrix. These nanoparticles can interact with light in unique ways, leading to improved optical characteristics.





* To whom correspondence author M. Al-Anber, masachem@mutah.edu.jo

NH_3 GAS SENSOR BASED ON GRAPHENE NANOCOMPOSITE HYDROGELS

Borhan Aldeen A. Albiss [1], Nathir A. AL-Rawashdeh [2], Asala Mohammad Khairi Saleh [2]

[1] *Nanomaterials Laboratory, Department of Applied Physics, Jordan University of Science and Technology, Irbid, Jordan*

[2] *Chemistry Department, Faculty of Science and Arts, Jordan University of Science and Technology, Irbid 22110, Jordan*

A flexible gas sensor has been developed using nanocomposite hydrogels, a combination of materials including Arabic gum, acrylic acid, reduced graphene oxide, and silver nanoparticles. The hydrogels show excellent swelling ability, making them suitable for accommodating gas molecules like NH_3. The RGO/AgNPs/AGPAAc-hydrogel showed higher sensitivity and stability to NH_3 gas compared to other variants. The improved properties may be due to the combined effect of silver nanoparticles and reduced graphene oxide. The sensor was characterized using various techniques, including FTIR, AFM, XRD, SEM, XRF, TGA, DSC, and NMR. The sensor has potential applications in environmental monitoring and industrial safety. The study suggests that this flexible gas sensor could be beneficial in environmental monitoring and industrial safety.

Ionic-Electronic Coupling in PEO-PEDOT/Potassium Triflate composite Films for Organic Mixed Conductivity Enhancement

Lina A. Alakhras[1], Qais M. Al-Bataineh[2,3*], Ahmad A. Ahmad[3], Ahmad Telfah[4,5,*]

[1] *Department of Physics, Jordan University of Science and Technology, P.O. Box 3030, Irbid 22110, Jordan.*

[2] *Experimental Physics, TU Dortmund University, 44227 Dortmund, Germany.*

[3] *Leibniz Institut für Analytische Wissenschaften-ISAS-e.V., 44139 Dortmund, Germany.*

[4] *Nanotechnology Center, The University of Jordan, 11942 Amman, Jordan.*

[5] *Department of Physics, University of Nebraska at Omaha, Omaha NE-68182, USA*

ABSTRACT

Organic mixed ionic-electronic conductors (OMIECs) are organic materials capable of transporting both ionic species and electronic charges, facilitating ionic-electronic coupling and enhancing electrical conductivity. PEO-PEDOT/ KOTf composite films synthesized in this study demonstrate significant electrical conductivity enhancement due to the ionic-electronic coupling. The electrical conductivity of PEO-PEDOT is 7.05 S.cm1 , predominantly arising from the electronic transport of PEDOT polarons with a minor contribution from ionic transport in PEO. However, introducing KOTf into the PEO-PEDOT matrix at varying concentrations gradually increases electrical conductivity. At a KOTf concentration of 16 wt.%, the electrical conductivity reaches 51.06 S.cm1 . This pronounced enhancement can be primarily due to the ionic-electronic coupling occurring at the interface between phase-separated regions within the polymer matrix. The incorporation of KOTf into PEO-PEDOT was characterized using FTIR spectroscopy. Moreover, our investigation involved X-ray diffraction and differential scanning calorimetry analysis, which unveiled a notable trend. As the KOTf concentrations increased, the degree of crystallinity in the PEO-PEDOT/KOTf composite films declined. This observation provides valuable insights into the structural changes occurring within the films as KOTf is integrated. The potential implications of this discovery span across numerous fields, opening exciting possibilities for advancing electronic and energy-related technologies.

Plasmon-Exciton coupling of Ag@TiO2 nanocomposites for high photocatalytic activity

Alaa Bani Omer[a,*], Qais Al-Bataineh[b,c,d], Ahmad Al-Omari[a], Ahmad Telfah[b]

1 Department of Physical Sciences, Jordan University of Science & Technology, P.O. Box 3030, Irbid-22110, Jordan.
2 Nanotechnology Center, The University of Jordan, 11942, Amman, Jordan.
3 Leibniz Institut für Analytische Wissenschaften-ISAS-e.V., Bunsen-Kirchhoff-Straße 11, 44139 Dortmund, Germany.
4 Experimental Physics, TU Dortmund University, 44227 Dortmund, Germany.

ABSTRACT

Azo-dyes are widely used in textile industries as well a hazardous wastewater pollutant. Photocatalyst mechanism is one of the most effective methods for wastewater treatment. In this research, we was studied photocatalytic mechanism and degradation pathway of acid red 1 (AR1) by titanium dioxide nanoparticles (TiO2NPs) upon long-wavelength UV-irradiation. Many parameters affects on the AR1 degradation, such as photocatalytic nanoparticles concentration, AR1 concentration, and the wavelength of irradiation light. Titanium dioxide nanoparticles (TiO2NPs) was improved by coating with Ag shell to get high activity of photocatalyst. The size, shape, morphology, and crystallinity of TiO2NPs and Ag@TiO2NPs were examined by Scanning Electron Microscope (SEM), X-ray diffraction (XRD), and UV-Vis spectrophotometer. After that, the photocatalyst mechanism, degradation efficiency, and degradation pathway were studied by employing UV-Vis spectrophotometer, Fourier transform infrared spectroscopy (FTIR), and Nuclear magnetic resonance spectroscopy (NMR).

Crystalline Field Effects on Magnetic and Thermodynamic properties of a Ferrimagnetic Centered Rectangular Structure

R Abu Haifa , M Gharaibeh* and A Obeidat

Department of Physics, Jordan University of Science and Technology, Irbid 22110, Jordan

Received: 24 March 2022 / Accepted: 16 August 2022 / Published online: 4 September 2022

Abstract

The magnetic properties and phase diagrams of the mixed spin Ising model, with spins S = 1 and σ = 1/2 on a centered rectangular structure, have been investigated using Monte Carlo simulations based on the Metropolis algorithm. Every spin at one lattice site has four nearest neighbor spins of the same type and four of the other type. We have assumed ferromagnetic interaction between the same spins type, antiferromagnetic for different spin types. An additional singlesite crystal field term on the S = 1 site was considered. We have shown that the crystal field enhances the existence of the compensation behavior of the system. In addition, the effects of the crystal field and exchange coupling on the magnetic properties and phase diagrams of the system have been studied. Finally, the magnetic hysteresis cycles of the system for several values of the crystal field have been found.

Exploring the Thermomagnetic Behavior of Co2TiZ (Z=Al, Si, Ga, Ge, and Sn) Alloys: AComputational Study

Abeer Alrousan1 ,Bilal Aladerah1 , Maen Gharaibeh1 , Abdalla Obeidat1

1Department of Physics, Jordan University of Science and Technology, Irbid 22110, Jordan

Abstract

A comprehensive computational exploration of the structural and thermomagnetic properties of Co2TiZ (Z=Al, Si, Ga, Ge, and Sn) Heusler alloys are conducted utilizing both density functional theory (DFT) and Monte Carlo simulations (MC). Our calculations revealed that the XA prototype consistently exhibited larger lattice parameters than the L21 structure. Furthermore, the investigation of exchange parameters uncovered distinct differences between the L21 and XA prototypes. The L21 structures consistently exhibited stronger Co-Co interactions, while the XA prototypes showcased more pronounced Co-Ti interactions. The calculated Curie temperatures (Tc) varied between the L21 and XA prototypes, highlighting the significance of atomic arrangement. The calculated critical temperature Tc of Co2TiAl exhibited variation depending on the structural prototype, and it is determined to be equal to 131K for the L21 prototype, while in the XA structure, it increases significantly to 248K. The higher Tc indicates improved thermal stability, expanding the material's operational range and making it suitable for applications that require magnetic functionality at higher temperatures

Optical and Physical Properties of Silicone Oil Extracted from the Vitreous of Patients Who Underwent Vitrectomy for Retinal Detachment

1 Areen Bani-Salameh, Rami Al-Dwairi,1 Ahmad A. Ahmad,2 Abdelwahab Aleshawi, 2 Ihsan A. Aljarrah,2 Qais M. Al-Bataineh,2,3 Hasan Mohidat,1 and Ahmed H. Al Sharie1.*

1Division of Ophthalmology, Department of Special Surgery, Faculty of Medicine, Jordan University of Science & Technology, Irbid, Jordan.
2 Thin Films and Nanotechnology Lab., Department of Physics, Jordan University of Science & Technology, Irbid, Jordan.
*3 Leibniz Institut fu¨r Analytische Wissenschaften-ISAS-e.V., Dortmund, Germany. *Current affiliation: Faculty of Medicine, Jordan University of Science & Technology, Irbid, Jordan.*

Abstract 1
Silicone oil (SO) is a crucial tool in vitreoretinal surgery. SO has the tendency to emulsify depending on certain factors. In this work, detailed analyses have been conducted to understand changes that occurred to the physical, optical, and chemical characteristics of the oil after removal from the vitreous cavity.

E/Z Reversible Photoisomerization of Methyl Orange Doped Polyacrylic Acid-based Polyelectrolyte Brush Films

Qais M. Al-Bataineh1,2,3| Ahmad D. Telfah1,4| Ahmad A. Ahmad3|Areen A. Bani-Salameh3| Rund Abu-Zurayk4,5| Roland Hergenröder1
1Leibniz Institut für AnalytischeWissenschaften-ISAS-e.V., Dortmund,Germany
2Experimental Physics, TU DortmundUniversity, Dortmund, Germany
3Department of Physics, Jordan Universityof Science & Technology, Irbid, Jordan
4Nanotechnology Center, The Universityof Jordan, Amman, Jordan
5Hamdi Mango Center for ScientificResearch, The University of Jordan,Amman,jordan

Abstract 2
The photoswitching behavior of the polyelectrolyte brush film based on polyacrylic acid (PAA) doped by methyl orange (MO) was investigated. The kinetics and time evolution of the photoisomerization and reverse thermal isomerization from E-state to Z-state upon irradiating the PAA-MO PEBs film by UV-light, and back again to E-state by thermal relaxation was explored and linked with the variation of the absorbance spectra and the electrical conductivity. The E-Z transformation transforms the azobenzene from flat with no dipole moment to 3.0 Debye dipole moment and therefore, the electrical conductivity escalated associated to the-Z transformation. In addition, the transforming of E-state to Z-state was led to collapse the formed brushes due to the angular rotational momentum consequent to E-Z isomerization.

Wide-field surface plasmon resonance microscopy for discrete particle detection

Qais M. Al-Bataineh
Leibniz Institut für Analytische Wissenschaften-ISAS-e.V
Ahmad D. Telfah
The University of Jordan
Carlos J. Tavares
University of Minho
Roland Hergenröder
Leibniz Institut für Analytische Wissenschaften-ISAS-e.V

Abstract

Wide-field surface plasmon resonance microscopy (WF-SPRM) based on Kretschmann's model is a powerful technique for nano-object detection in solution. Traditional mathematical medium model was used to describe the SPR sensor principle, in which molecules bound on the sensor surface are treated as an effective medium with effective refractive index and thickness. In this work, a discrete particle model of SPR is derived to describe the SPR sensor principle of discrete particle detection. Theoretical, numerical, and experimental analysis of SPR detection principle by considering the discrete particle detection. The calculated intensity profile of the single nanoparticle and 2-nanopaerticles from the discrete particle model is accepted with the experimental data.

Polyaniline Films Doped with Protonic Acids: Protonated Polyaniline Films

Dina M Amerah1, Ahmad A. Ahmad1, Qais M. Al-Bataineh2,3,*, Ahmad Telfah4

1 Department of Physical Sciences, Jordan University of Science & Technology, P.O. Box 3030, Irbid-22110, Jordan.

2 Leibniz Institut für Analytische Wissenschaften-ISAS-e.V., Bunsen-Kirchhoff-Straße 11, 44139 Dortmund, Germany.

3 Experimental Physics, TU Dortmund University, 44227 Dortmund, Germany.

4 Nanotechnology Center, The University of Jordan, 11942, Amman, Jordan.

Abstract

The specific choice of protonic acid can affect the achievable conductivity and the other properties of the polyaniline (PANI) films. Therefore, different acids, including hydrochloric acid (HCl), camphorsulfonic acid (CSA), formic acid (FA), and nitric acid (NA), were used to protonate PANI film for improving the optical properties and electrical conductivity by introducing states within the forbidden gap. FTIR spectra confirmed the protonation mechanism in the protonated PANI. XRD patterns illustrate that pure PANI, PANI/FA, and PANI/NA films exhibit an amorphous nature, whereas PANI/CSA and PANI/HCl films have semicrystalline nature. SEM micrographs confirm that protonated PANI with different acids results in different morphologies. TGA curves show that PANI and protonated PANI films are thermally stable in temperatures up to 170°C. The bandgap energy of pure PANI film is 4.04 eV. Protonated PANI with CSA, HCl, FA, and NA decreases the bandgap energy to 3.65, 3.40, 3.81, and 3.73 eV, respectively. The electrical conductivity of pure PANI is relatively low but can be greatly enhanced by doping with protonic acids. The higher electrical conductivity was 0.85 S.cm-1 for PANI/CSA film. These characteristics make the protonated PANI films suitable for optoelectronics, sensors, and energy storage devices.

A quick and straightforward method to determine a film thickness of an investigated material at low primary electron energy.

Ahmad M D (Assa'd) Jaber

Department of Medical Sciences- Faculty of Medicine- Aqaba Medical Sciences University
Port Hwy, Aqaba 77110
Jordan

Abstract:

The present work proposed a new method to calculate an electron thin film thickness at low primary electron energy. The method uses the ratio of transmitted elastic peak intensity to the transmitted background spectrum intensity. The method demonstrates the potential of low-loss energy electron in transmission electron microscopy as a quick and straightforward method to determine the film thickness of the investigated material. The method was applied to measure the film thickness of Si (as a light material) and Au (as a heavy material) between 2 nm and 10 nm at 1000 eV electron beam energy. The estimated error in the Si film thickness was 5% at thickness below 4 nm and 10% at higher thickness.

Synthesis and characterization of Propyltrimethyltrisamine Methyl Ester Silica Gel Material (SG-TAME) for Capturing Uranium ions

Mohammed A. Al-Anber[*, 1], Neda'a Al-Adaileh [1], M. A. Zaitoun [2], Idrees F. Al-Momani [3], Ahmad K. Hijazi [4]

[1] *Department of Chemistry, Faculty of Sciences, Mutah University, P.O. Box 7, 61710 Al-Karak, Jordan; E-mail: (masachem@mutah.edu.jo).*

[2] *Department of Pharmaceutical Sciences, Faculty of Pharmacy, Yarmouk University, Irbid, Jordan.*

[3] *Department of Chemistry, Faculty of Sciences, Yarmouk University, Irbid, Jordan.*

[5] *Department of Chemistry, Faculty of Sciences, Jordan University of Science and Technology, Irbid, Jordan*

Abstract:

A propyltrimethyltrisamine methyl ester silica gel material, SG-TAME, has successfully enhanced the capturing of UO_2^{2+} ions from water. The primary objective of this study is to investigate the sorption capabilities of SG-TAME for aqueous uranium (VI) ions through batch sorption experiments. Several key parameters affecting sorption, including pH, initial concentration, temperature, and dosage, were meticulously controlled to gain insights into the sorption process's thermodynamic and kinetic aspects and determine the mechanisms involved. The equilibrium sorption was observed to occur within just 5 to 10 minutes under a variety of conditions. The maximum capturing capacity of uranium (VI) ions into SG-TAME is found to be ca. 99%. The sorption behavior of U(VI) ions on SG-TAME followed the Langmuir isotherm model ($R^2 \approx 1$). The motivation for the sorption process was attributed to the chemisorption of U(IV) ions *via* amino active sites, forming an inner complex sphere of the general form SG-TAME-U(VI). This finding was supported by the pseudo-second-order kinetic model ($R^2 \approx 1$), which provided insights into the rate constant and sorption capacities. The obtained information could potentially be utilized to develop a technology utilizing SG-TAME material for the removal of uranium ions from water or for peaceful reuse applications.

Loading of Silver (I) Ion into L-Cysteine-Functionalized Silica Gel Material

Mohammed A. Al-Anber [*, 1], Malak M. Al Jaafreh [1], Idrees F. Al-Momani [2], Ahmed Hijazi [3], Dinara Sobola[4,5]

[1] *Department of Chemistry, Faculty of Sciences, Mutah University, P.O. Box 7, 61710 Al-Karak, Jordan; E-mail: (masachem@mutah.edu.jo).*
[2] *Department of Chemistry, Faculty of Sciences, Yarmouk University, Irbid, Jordan.*
[3] *Department of Chemistry, Faculty of Sciences, Jordan of Science and Technology, Irbid, Jordan.*
[4] *Department of Physics, Faculty of Electrical Engineering and Communication, Brno University of Technology, Technická 2848/8, 61600 Brno, the Czech Republic*
[5] *Institute of Physics of Materials, Czech Academy of Sciences, Žižkova 22, 61662 Brno, the Czech Republic*

Abstract:
The Silver (I) Ion into the L-Cysteine (SG-Cys$^-$Na$^+$) matrix was successfully loaded with silver (I) ions using the batch sorption technique. The optimal loading of Ag(I) into SG-Cys$^-$Na$^+$ was 98 % at pHi = 6.2, 80 rpm, 1 mg L^{-1}, and T = 55 °C. Langmuir isotherm is found to be suitable for the binding of Ag(I) into SG-Cys$^-$Na$^+$ active sites as a homogenous monolayer (R^2 = 0.999), which is identified by using FTIR spectroscopy. XRD indicated the stability of the matrix and the absence of Ag_2O and Ag(0) phases as identified from the diffraction peaks. The pseudo-second-order model (R^2 > 0.999) assumes that the rate of adsorption is controlled by chemisorption, which involves the formation of a chemical bond between the silver ions and the surface of SG-Cys$^-$Na$^+$. The thermodynamic parameters were calculated, showing that higher initial concentrations can lead to higher equilibrium constants, negative ΔG values, positive ΔS values, and negative ΔH. This study aimed to investigate the saturation of a silica surface with silver ions and explore the mechanisms involved in their association. This research serves as an introductory step toward the next study, which focuses on reducing the silver ions attached to the surface to convert the silica surface into a conductive surface.
Keywords: Silver (I) Ion; L-Cysteine; Langmuir isotherm; thermodynamic parameters

Analysis of Field Electron Emission from Gold Surfaces Using FN and MG Equations

Aseel Aljabarat[1], Qassim Al-hroub[1*], Ahmad Telfah[2], Marwan S. Mousa[1*]

[1] *Surface Physics and Materials Technology Lab., Department of Physics, Mutah University, Al-Karak 61710, Jordan.*

[2] *Leibniz-Institut für Analytische Wissenschaften – ISAS – e.V. (ISAS), Bunsen-Kirchhoff-Str. 11, 44139 Dortmund.*

Abstract: Field electron emission from gold surfaces is a widely studied phenomenon with applications ranging from electron microscopy to vacuum electronic devices. This research paper offers a detailed analysis of field electron emission data acquired from gold surfaces using the Fowler-Nordheim (FN) and Murphy-Good (MG) equations, with a focus on the influence of electric field strength**.** Our investigation reveals valuable insights into the mechanisms of field electron emission, with an emphasis on the role of the applied electric field. FN and MG equations are employed to describe the emission process, and their suitability is assessed based on the experimental data. The results demonstrate the accuracy and limitations of these equations under varying electric field conditions. We find that the FN equation is particularly effective in describing electron emission at lower electric field strengths, while the MG equation excels in higher field regimes. By examining the data, we identify key factors affecting emission efficiency, including the surface morphology and cleanliness of the gold sample. Nanostructured gold surfaces, such as nanowires and tips, are shown to significantly enhance electron emission by locally intensifying the electric field.

In conclusion, this research advances our understanding of the fundamental processes involved in field electron emission from gold and provides a comprehensive analysis of FN and MG equations. The findings contribute to the development of efficient electron sources and inform the design of advanced electronic devices, with a particular emphasis on the electric field as a critical parameter in the emission process.

Key words: Gold tips, Fowler-Nordheim (FN) and Murphy-Good (MG) equations, Field Electron Emission.

International Scientific Committee

Prof. Boguslaw Buszewski

Nicolaus Copernicus Universit, Torun, Poland

Prof. Marian Jaskula

Jagiellonian University, Faculty of Chemistry, Torun, Poland

Prof. Mahdi Latayfeh

Dept. of Physics, Editor in Chief of J. Journal of Physics, Yarmouk University, Irbid

Faculty of Pharmacy, Tishk International University, Erbil, Iraq

Prof. Rajni Hatti Kaul

Division of Biotechnology, Department of Chemistry, Lund University, Sweden

Prof. Aleksandra Cvetanovic Kljakic

Dept. of Pharmaceutical Eng. and Biotechnology, University of Novi Sad, Serbia

Prof. Rupert Schreiner

Applied Physics and Microsystems Technology, OTH Regensburg, Germany

Dr. Ahmad Telfah

Leibnitz-Institut fur Analytische Wissenschaften -ISAS- Dortmund, Germany

Prof. Yaseen Al-Soud

Department of Chemistry, College of Science, Uni of Al al-Bayt, Al-Mafraq, Jordan

Prof. Ildiko Tulbure

University "1 Decembrie 1918" Alba Iulia, Romania

Prof. Oskar Maria Baksalary

Faculty of Physics, Adam Mickiewicz University, Poland

Prof. M.-Ali Al-Akhras (Al-Omari)

Bio-Medical Physics Laboratory, Department of Physics, (JUST) Jordan.

Prof. Mohammad El-Khateeb
Dept. of Chemistry, JUST, Jordan.

Conference Local Committee

Prof. Dr. Marwan S. Mousa, Department of Physics, Mutah University

Prof. Dr. Mohammed Al-Anber, Dept. of Chemistry, Mutah University

Prof. Dr. Amin Agel, Dean of Faculty of Pharmacy, Mutah University

Prof. Dr. Osama Mohawesh, Dean of Sci. Research, Mutah University

Dr. Moaz Altarawneh, Dean, Faculty of Science, Mutah University

Dr. Waleed Rawadieh, Director of Public Relations, Mutah University

Dr Osama Kasabeh, Dept. of Phyics, Mutah University

Prof. Dr. Khaled Khleifat, Department of Biology, Mutah University

Dr. Waleed Manasra, Department of Chemistry, Mutah University

Prof. Dr. Hmoud Al-Dmour, Department of Physics, Mutah University

Dr. Amal Al-Maaitah, Head of Physics Department, Mutah University

Prof. Dr. Wael Abu Dayyih, Faculty of Pharmacy, Mutah University

Prof. Dr. Afaf Alnadaf, Faculty of Pharmacy, Mutah University

Dr. Lidia Alhalaseh, Faculty of Pharmacy, Mutah University

Dr. Yasser Gaber, Faculty of Pharmacy, Mutah University

Dr. Mousa Magharbeh, Faculty of Pharmacy, Mutah University

Dr. Rakan Altarwaneh, Head of Chemistry Dept., Mutah University

Dr. Mousa Magharbeh, V Dean, Faculty of Pharmacy, Mutah University

Dr Tahani Hjazeen, Biology Department, Mutah University

Prof. Dr. Feryal Kherissat, Biology Department, Mutah University

Dr Damen Maayta, Public Relations Department, Mutah University

Dr Maen Al Kafaween, Finance Department, Mutah University

Jafar Altarwneh, Head of Supplies, Mutah University